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<b>(54) Title:</b> METHOD AND REAGENT FOR THE TREATMENT OF DISEASES OR CONDITIONS RELATED TO LEVELS OF VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR  <b>(57) Abstract</b>  Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.		

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DESCRIPTIONMethod and Reagent for the Treatment of Diseases or  
Conditions Related to Levels of Vascular Endothelial  
Growth Factor ReceptorBackground Of The Invention

This application is a continuation-in-part of Pavco et al., U.S. Serial No. 60/005,974 all of which is hereby incorporated by reference herein (including drawings).

5 This invention relates to methods and reagents for the treatment of diseases or conditions relating to the levels of expression of vascular endothelial growth factor (VEGF) receptor(s).

The following is a discussion of relevant art, none  
10 of which is admitted to be prior art to the present invention.

VEGF, also referred to as vascular permeability factor (VPF) and vasculotropin, is a potent and highly specific mitogen of vascular endothelial cells (for a  
15 review see Ferrara, 1993 *Trends Cardiovas. Med.* 3, 244; Neufeld et al., 1994 *Prog. Growth Factor Res.* 5, 89). VEGF induced neovascularization is implicated in various pathological conditions such as tumor angiogenesis, proliferative diabetic retinopathy, hypoxia-induced  
20 angiogenesis, rheumatoid arthritis, psoriasis, wound healing and others.

VEGF, an endothelial cell-specific mitogen, is a 34-45 kDa glycoprotein with a wide range of activities that include promotion of angiogenesis, enhancement of  
25 vascular-permeability and others. VEGF belongs to the platelet-derived growth factor (PDGF) family of growth factors with approximately 18% homology with the A and B chain of PDGF at the amino acid level. Additionally, VEGF contains the eight conserved cysteine residues common to  
30 all growth factors belonging to the PDGF family (Neufeld et al., *supra*). VEGF protein is believed to exist

predominantly as disulfide-linked homodimers; monomers of VEGF have been shown to be inactive (Plouet et al., 1989 *EMBO J.* 8, 3801).

VEGF exerts its influence on vascular endothelial cells by binding to specific high-affinity cell surface receptors. Covalent cross-linking experiments with <sup>125</sup>I-labeled VEGF protein have led to the identification of three high molecular weight complexes of 225, 195 and 175 kDa presumed to be VEGF and VEGF receptor complexes (Vaisman et al., 1990 *J. Biol. Chem.* 265, 19461). Based on these studies VEGF-specific receptors of 180, 150 and 130 kDa molecular mass were predicted. In endothelial cells, receptors of 150 and the 130 kDa have been identified. The VEGF receptors belong to the superfamily of receptor tyrosine kinases (RTKs) characterized by a conserved cytoplasmic catalytic kinase domain and a hydrophylic kinase sequence. The extracellular domains of the VEGF receptors consist of seven immunoglobulin-like domains that are thought to be involved in VEGF binding functions.

The two most abundant and high-affinity receptors of VEGF are flt-1 (*fms*-like tyrosine kinase) cloned by Shibuya et al., 1990 *Oncogene* 5, 519 and KDR (kinase-insert-domain-containing receptor) cloned by Terman et al., 1991 *Oncogene* 6, 1677. The murine homolog of KDR, cloned by Mathews et al., 1991, *Proc. Natl. Acad. Sci., USA*, 88, 9026, shares 85% amino acid homology with KDR and is termed as flk-1 (fetal liver kinase-1). Recently it has been shown that the high-affinity binding of VEGF to its receptors is modulated by cell surface-associated heparin and heparin-like molecules (Gitay-Goren et al., 1992 *J. Biol. Chem.* 267, 6093).

VEGF expression has been associated with several pathological states such as tumor angiogenesis, several forms of blindness, rheumatoid arthritis, psoriasis and others. Following is a brief summary of evidence supporting the involvement of VEGF in various diseases:



1) Tumor angiogenesis: Increased levels of VEGF gene expression have been reported in vascularized and edema-associated brain tumors (Berkman et al., 1993 *J. Clin. Invest.* 91, 153). A more direct demonstration of the role of VEGF in tumor angiogenesis was demonstrated by Jim Kim et al., 1993 *Nature* 362, 841 wherein, monoclonal antibodies against VEGF were successfully used to inhibit the growth of rhabdomyosarcoma, glioblastoma multiforme cells in nude mice. Similarly, expression of a dominant negative mutated form of the flt-1 VEGF receptor inhibits vascularization induced by human glioblastoma cells in nude mice (Millauer et al., 1994, *Nature* 367, 576).

2) Ocular diseases: Aiello et al., 1994 *New Engl. J. Med.* 331, 1480, showed that the ocular fluid, of a majority of patients suffering from diabetic retinopathy and other retinal disorders, contains a high concentration of VEGF. Miller et al., 1994 *Am. J. Pathol.* 145, 574, reported elevated levels of VEGF mRNA in patients suffering from retinal ischemia. These observations support a direct role for VEGF in ocular diseases.

3) Psoriasis: Detmar et al., 1994 *J. Exp. Med.* 180, 1141 reported that VEGF and its receptors were over-expressed in psoriatic skin and psoriatic dermal microvessels, suggesting that VEGF plays a significant role in psoriasis.

4) Rheumatoid arthritis: Immunohistochemistry and *in situ* hybridization studies on tissues from the joints of patients suffering from rheumatoid arthritis show an increased level of VEGF and its receptors (Fava et al., 1994 *J. Exp. Med.* 180, 341). Additionally, Koch et al., 1994 *J. Immunol.* 152, 4149, found that VEGF-specific antibodies were able to significantly reduce the mitogenic activity of synovial tissues from patients suffering from rheumatoid arthritis. These observations support a direct role for VEGF in rheumatoid arthritis.

In addition to the above data on pathological conditions involving excessive angiogenesis, a number of

studies have demonstrated that VEGF is both necessary and sufficient for neovascularization. Takashita et al., 1995 *J. Clin. Invest.* 93, 662, demonstrated that a single injection of VEGF augmented collateral vessel development in a rabbit model of ischemia. VEGF also can induce neovascularization when injected into the cornea. Expression of the VEGF gene in CHO cells is sufficient to confer tumorigenic potential to the cells. Kim et al., *supra* and Millauer et al., *supra* used monoclonal antibodies against VEGF or a dominant negative form of flk-1 receptor to inhibit tumor-induced neovascularization.

During development, VEGF and its receptors are associated with regions of new vascular growth (Millauer et al., 1993 *Cell* 72, 835; Shalaby et al., 1993 *J. Clin. Invest.* 91, 2235). Furthermore, transgenic mice lacking either of the VEGF receptors are defective in blood vessel formation, in fact these mice do not survive; flk-1 appears to be required for differentiation of endothelial cells, whileflt-1 appears to be required at later stages of vessel formation (Shalaby et al., 1995 *Nature* 376, 62; Fung et al., 1995 *Nature* 376, 66). Thus, these receptors must be present to properly signal endothelial cells or their precursors to respond to vascularization-promoting stimuli.

All of the conditions listed above, involve extensive vascularization. This hyper-stimulation of endothelial cells may be alleviated by VEGF antagonists. Thus most of the therapeutic efforts for the above conditions have concentrated on finding inhibitors of the VEGF protein.

Kim et al., 1993 *Nature* 362, 841 have been successful in inhibiting VEGF-induced tumor growth and angiogenesis in nude mice by treating the mice with VEGF-specific monoclonal antibody.

Koch et al., 1994 *J. Immunol.* 152, 4149 showed that the mitogenic activity of microvascular endothelial cells found in rheumatoid arthritis (RA) synovial tissue explants and the chemotactic property of endothelial cells

from RA synovial fluid can be neutralized significantly by treatment with VEGF-specific antibodies.

Ullrich et al., International PCT Publication No. WO 94/11499 and Millauer et al., 1994 *Nature* 367, 576 used a soluble form of flk-1 receptor (dominant-negative mutant) to prevent VEGF-mediated tumor angiogenesis in immunodeficient mice.

Kendall and Thomas, International PCT Publication No. WO 94/21679 describe the use of naturally occurring or recombinantly-engineered soluble forms of VEGF receptors to inhibit VEGF activity.

Robinson, International PCT Publication No. WO 95/04142 describes the use of antisense oligonucleotides targeted against VEGF RNA to inhibit VEGF expression.

Jellinek et al., 1994 *Biochemistry* 33, 10450 describe the use of VEGF-specific high-affinity RNA aptamers to inhibit the binding of VEGF to its receptors.

Rockwell and Goldstein, International PCT Publication No. WO 95/21868, describe the use of anti-VEGF receptor monoclonal antibodies to neutralize the the effect of VEGF on endothelial cells.

#### Summary Of The Invention

The invention features novel nucleic acid-based techniques [e.g., enzymatic nucleic acid molecules (ribozymes), antisense nucleic acids, 2-5A antisense chimeras, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups (Cook et al., U.S. Patent 5,359,051)] and methods for their use to down regulate or inhibit the expression of receptors of VEGF (VEGF-R).

In a preferred embodiment, the invention features use of one or more of the nucleic acid-based techniques to inhibit the expression of flt-1 and/or flk-1/KDR receptors.

By "inhibit" it is meant that the activity of VEGF-R or level of mRNAs or equivalent RNAs encoding VEGF-R is reduced below that observed in the absence of the nucleic acid. In one embodiment, inhibition with ribozymes

preferably is below that level observed in the presence of an enzymatically inactive RNA molecule that is able to bind to the same site on the mRNA, but is unable to cleave that RNA. In another embodiment, inhibition with anti-sense oligonucleotides is preferably below that level observed in the presence of for example, an oligonucleotide with scrambled sequence or with mismatches.

By "enzymatic nucleic acid molecule" it is meant an RNA molecule which has complementarity in a substrate binding region to a specified gene target, and also has an enzymatic activity which is active to specifically cleave target RNA. That is, the enzymatic RNA molecule is able to intermolecularly cleave RNA and thereby inactivate a target RNA molecule. This complementary regions allow sufficient hybridization of the enzymatic RNA molecule to the target RNA and thus permit cleavage. One hundred percent complementarity is preferred, but complementarity as low as 50-75% may also be useful in this invention. By "equivalent" RNA to VEGF-R is meant to include those naturally occurring RNA molecules in various animals, including human, mice, rats, rabbits, primates and pigs.

By "antisense nucleic acid" it is meant a non-enzymatic nucleic acid molecule that binds to target RNA by means of RNA-RNA or RNA-DNA or RNA-PNA (protein nucleic acid; Egholm et al., 1993 *Nature* 365, 566) interactions and alters the activity of the target RNA (for a review see Stein and Cheng, 1993 *Science* 261, 1004).

By "2-5A antisense chimera" it is meant, an antisense oligonucleotide containing a 5' phosphorylated 2'-5'-linked adenylate residues. These chimeras bind to target RNA in a sequence-specific manner and activate a cellular 2-5A-dependent ribonuclease which, in turn, cleaves the target RNA (Torrence et al., 1993 *Proc. Natl. Acad. Sci. USA* 90, 1300).

By "triplex DNA" it is meant an oligonucleotide that can bind to a double-stranded DNA in a sequence-specific manner to form a triple-strand helix. Formation of such

triple helix structure has been shown to inhibit transcription of the targeted gene (Duval-Valentin et al., 1992 *Proc. Natl. Acad. Sci. USA* 89, 504).

By "gene" it is meant a nucleic acid that encodes an RNA.

By "complementarity" it is meant a nucleic acid that can form hydrogen bond(s) with other RNA sequence by either traditional Watson-Crick or other non-traditional types (for example, Hoogsteen type) of base-paired interactions.

Six basic varieties of naturally-occurring enzymatic RNAs are known presently. Each can catalyze the hydrolysis of RNA phosphodiester bonds in trans (and thus can cleave other RNA molecules) under physiological conditions. Table I summarizes some of the characteristics of these ribozymes. In general, enzymatic nucleic acids act by first binding to a target RNA. Such binding occurs through the target binding portion of a enzymatic nucleic acid which is held in close proximity to an enzymatic portion of the molecule that acts to cleave the target RNA. Thus, the enzymatic nucleic acid first recognizes and then binds a target RNA through complementary base-pairing, and once bound to the correct site, acts enzymatically to cut the target RNA. Strategic cleavage of such a target RNA will destroy its ability to direct synthesis of an encoded protein. After an enzymatic nucleic acid has bound and cleaved its RNA target, it is released from that RNA to search for another target and can repeatedly bind and cleave new targets. Thus, a single ribozyme molecule is able to cleave many molecules of target RNA. In addition, the ribozyme is a highly specific inhibitor of gene expression, with the specificity of inhibition depending not only on the base-pairing mechanism of binding to the target RNA, but also on the mechanism of target RNA cleavage. Single mismatches, or base-substitutions, near the site of cleavage can completely eliminate catalytic activity of a ribozyme.

Ribozymes that cleave the specified sites in VEGF-R mRNAs represent a novel therapeutic approach to treat tumor angiogenesis, ocular diseases, rheumatoid arthritis, psoriasis and others. Applicant indicates that ribozymes  
5 are able to inhibit the activity of VEGF-R (specifically flt-1 and flk-1/KDR) and that the catalytic activity of the ribozymes is required for their inhibitory effect. Those of ordinary skill in the art will find that it is clear from the examples described that other ribozymes  
10 that cleave VEGF-R mRNAs may be readily designed and are within the invention.

In preferred embodiments of this invention, the enzymatic nucleic acid molecule is formed in a hammerhead or hairpin motif, but may also be formed in the motif of  
15 a hepatitis delta virus, group I intron or RNaseP RNA (in association with an RNA guide sequence) or *Neurospora* VS RNA. Examples of such hammerhead motifs are described by Rossi et al., 1992, *AIDS Research and Human Retroviruses* 8, 183, of hairpin motifs by Hampel et al., EP0360257,  
20 Hampel and Tritz, 1989 *Biochemistry* 28, 4929, and Hampel et al., 1990 *Nucleic Acids Res.* 18, 299, and an example of the hepatitis delta virus motif is described by Perrotta and Been, 1992 *Biochemistry* 31, 16; of the RNaseP motif by Guerrier-Takada et al., 1983 *Cell* 35, 849, *Neurospora* VS  
25 RNA ribozyme motif is described by Collins (Saville and Collins, 1990 *Cell* 61, 685-696; Saville and Collins, 1991 *Proc. Natl. Acad. Sci. USA* 88, 8826-8830; Collins and Olive, 1993 *Biochemistry* 32, 2795-2799) and of the Group I intron by Cech et al., U.S. Patent 4,987,071. These  
30 specific motifs are not limiting in the invention and those skilled in the art will recognize that all that is important in an enzymatic nucleic acid molecule of this invention is that it has a specific substrate binding site which is complementary to one or more of the target gene  
35 RNA regions, and that it have nucleotide sequences within or surrounding that substrate binding site which impart an RNA cleaving activity to the molecule.

In a preferred embodiment the invention provides a method for producing a class of enzymatic cleaving agents which exhibit a high degree of specificity for the RNA of a desired target. The enzymatic nucleic acid molecule is preferably targeted to a highly conserved sequence region of target mRNAs encoding VEGF-R proteins (specifically flt-1 and flk-1/KDR) such that specific treatment of a disease or condition can be provided with either one or several enzymatic nucleic acids. Such enzymatic nucleic acid molecules can be delivered exogenously to specific tissue or cellular targets as required. Alternatively, the ribozymes can be expressed from DNA and/or RNA vectors that are delivered to specific cells.

Synthesis of nucleic acids greater than 100 nucleotides in length is difficult using automated methods, and the therapeutic cost of such molecules is prohibitive. In this invention, small nucleic acid motifs (e.g., antisense oligonucleotides, hammerhead or the hairpin ribozymes) are used for exogenous delivery. The simple structure of these molecules increases the ability of the nucleic acid to invade targeted regions of the mRNA structure. However, these nucleic acid molecules can also be expressed within cells from eukaryotic promoters (e.g., Izant and Weintraub, 1985 *Science* 229, 345; McGarry and Lindquist, 1986 *Proc. Natl. Acad. Sci. USA* 83, 399; Sullenger-Scanlon et al., 1991, *Proc. Natl. Acad. Sci. USA*, 88, 10591-5; Kashani-Sabet et al., 1992 *Antisense Res. Dev.*, 2, 3-15; Dropulic et al., 1992 *J. Virol*, 66, 1432-41; Weerasinghe et al., 1991 *J. Virol*, 65, 5531-4; Ojwang et al., 1992 *Proc. Natl. Acad. Sci. USA* 89, 10802-6; Chen et al., 1992 *Nucleic Acids Res.*, 20, 4581-9; Sarver et al., 1990 *Science* 247, 1222-1225; Thompson et al., 1995 *Nucleic Acids Res.* 23, 2259). Those skilled in the art realize that any nucleic acid can be expressed in eukaryotic cells from the appropriate DNA/RNA vector. The activity of such nucleic acids can be augmented by their release from the primary transcript by a ribozyme (Draper

et al., PCT WO93/23569, and Sullivan et al., PCT WO94/02595, both hereby incorporated in their totality by reference herein; Ohkawa et al., 1992 Nucleic Acids Symp. Ser., 27, 15-6; Taira et al., 1991, Nucleic Acids Res., 19, 5125-30; Ventura et al., 1993 Nucleic Acids Res., 21, 3249-55; Chowrira et al., 1994 J. Biol. Chem. 269, 25856).

Such nucleic acids are useful for the prevention of the diseases and conditions discussed above, and any other diseases or conditions that are related to the levels of VEGF-R (specifically flt-1 and flk-1/KDR) in a cell or tissue.

By "related" is meant that the reduction of VEGF-R (specifically flt-1 and flk-1/KDR) RNA levels and thus reduction in the level of the respective protein will relieve, to some extent, the symptoms of the disease or condition.

Ribozymes are added directly, or can be complexed with cationic lipids, packaged within liposomes, or otherwise delivered to target cells or tissues. The nucleic acid or nucleic acid complexes can be locally administered to relevant tissues ex vivo, or in vivo through injection, infusion pump or stent, with or without their incorporation in biopolymers. In preferred embodiments, the ribozymes have binding arms which are complementary to the sequences in Tables II to IX. Examples of such ribozymes also are shown in Tables II to IX. Examples of such ribozymes consist essentially of sequences defined in these Tables. By "consists essentially of" is meant that the active ribozyme contains an enzymatic center equivalent to those in the examples, and binding arms able to bind mRNA such that cleavage at the target site occurs. Other sequences may be present which do not interfere with such cleavage.

In another aspect of the invention, ribozymes that cleave target RNA molecules and inhibit VEGF-R (specifically flt-1 and flk-1/KDR) activity are expressed from transcription units inserted into DNA or RNA vectors. The



recombinant vectors are preferably DNA plasmids or viral vectors. Ribozyme expressing viral vectors could be constructed based on, but not limited to, adeno-associated virus, retrovirus, adenovirus, or alphavirus. Preferably, the recombinant vectors capable of expressing the ribozymes are delivered as described above, and persist in target cells. Alternatively, viral vectors may be used that provide for transient expression of ribozymes. Such vectors might be repeatedly administered as necessary. Once expressed, the ribozymes cleave the target mRNA. Delivery of ribozyme expressing vectors could be systemic, such as by intravenous or intramuscular administration, by administration to target cells ex-planted from the patient followed by reintroduction into the patient, or by any other means that would allow for introduction into the desired target cell.

By "vectors" is meant any nucleic acid- and/or viral-based technique used to deliver a desired nucleic acid.

Other features and advantages of the invention will be apparent from the following description of the preferred embodiments thereof, and from the claims.

#### Description Of The Preferred Embodiments

First the drawings will be described briefly.

#### Drawings

Figure 1 is a diagrammatic representation of the hammerhead ribozyme domain known in the art. Stem II can be  $\geq 2$  base-pair long.

Figure 2a is a diagrammatic representation of the hammerhead ribozyme domain known in the art; Figure 2b is a diagrammatic representation of the hammerhead ribozyme as divided by Uhlenbeck (1987, *Nature*, 327, 596-600) into a substrate and enzyme portion; Figure 2c is a similar diagram showing the hammerhead divided by Haseloff and Gerlach (1988, *Nature*, 334, 585-591) into two portions; and Figure 2d is a similar diagram showing the hammerhead

divided by Jeffries and Symons (1989, *Nucl. Acids. Res.*, 17, 1371-1371) into two portions.

Figure 3 is a diagrammatic representation of the general structure of a hairpin ribozyme. Helix 2 (H2) is provided with a least 4 base pairs (i.e., n is 1, 2, 3 or 4) and helix 5 can be optionally provided of length 2 or more bases (preferably 3 - 20 bases, i.e., m is from 1 - 20 or more). Helix 2 and helix 5 may be covalently linked by one or more bases (i.e., r is  $\geq 1$  base). Helix 1, 4 or 5 may also be extended by 2 or more base pairs (e.g., 4 - 20 base pairs) to stabilize the ribozyme structure, and preferably is a protein binding site. In each instance, each N and N' independently is any normal or modified base and each dash represents a potential base-pairing interaction. These nucleotides may be modified at the sugar, base or phosphate. Complete base-pairing is not required in the helices, but is preferred. Helix 1 and 4 can be of any size (i.e., o and p is each independently from 0 to any number, e.g., 20) as long as some base-pairing is maintained. Essential bases are shown as specific bases in the structure, but those in the art will recognize that one or more may be modified chemically (abasic, base, sugar and/or phosphate modifications) or replaced with another base without significant effect. Helix 4 can be formed from two separate molecules, i.e., without a connecting loop. The connecting loop when present may be a ribonucleotide with or without modifications to its base, sugar or phosphate. "q" is  $\geq 2$  bases. The connecting loop can also be replaced with a non-nucleotide linker molecule. H refers to bases A, U, or C. Y refers to pyrimidine bases. "\_\_\_\_\_" refers to a covalent bond.

Figure 4 is a representation of the general structure of the hepatitis delta virus ribozyme domain known in the art.

Figure 5 is a representation of the general structure of the VS RNA ribozyme domain.

Figure 6 is a schematic representation of an RNaseH accessibility assay. Specifically, the left side of Figure 6 is a diagram of complementary DNA oligonucleotides bound to accessible sites on the target RNA. Complementary DNA oligonucleotides are represented by broad lines labeled A, B, and C. Target RNA is represented by the thin, twisted line. The right side of Figure 6 is a schematic of a gel separation of uncut target RNA from a cleaved target RNA. Detection of target RNA is by autoradiography of body-labeled, T7 transcript. The bands common to each lane represent uncleaved target RNA; the bands unique to each lane represent the cleaved products.

Figure 7 shows the effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF to the surface of human microvascular endothelial cells. Sequences of the ribozymes used are shown in Table II; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions (see Figure 11); U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose. The results of two separate experiments are shown as separate bars for each set. Each bar represents the average of triplicate samples. The standard deviation is shown with error bars. For the flt-1 data, 500 nM ribozyme (3:1 charge ratio with LipofectAMINE®) was used. Control 1-10 is the control for ribozymes 307-2797, control 11-20 is the control for ribozymes 3008-5585. The Control 1-10 and Control 11-20 represent the treatment of cells with LipofectAMINE® alone without any ribozymes.

Figure 8 shows the effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF to KDR on the surface of human microvascular endothelial

cells. Sequences of the ribozymes used are shown in Table IV; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions (see Figure 11); U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose. The Control 1-10 and Control 11-20 represent the treatment of cells with LipofectAMINE® alone without any ribozymes. Irrel. RZ, is a control experiment wherein the cells are treated with a non-KDR-targeted ribozyme complexed with Lipofectamine®. 200 nM ribozyme (3:1 charge ratio with LipofectAMINE®) was used. In addition to the KDR-targeted ribozymes, the effect on VEGF binding of a ribozyme targeted to an irrelevant mRNA (irrel. RZ) is also shown. Because the affinity of KDR for VEGF is about 10-fold lower than the affinity of flt-1 for VEGF, a higher concentration of VEGF was used in the binding assay.

Figure 9 shows the specificity of hammerhead ribozymes targeted against flt-1 receptor. Inhibition of the binding of VEGF, urokinase plasminogen activator (UPA) and fibroblast growth factor (FGF) to their corresponding receptors as a function of anti-FLT ribozymes is shown. The sequence and description of the ribozymes used are as described under Figure 7 above. The average of triplicate samples is given; percent inhibition as calculated below.

Figure 10 shows the inhibition of the proliferation of Human aortic endothelial cells (HAEC) mediated by phosphorothioate antisense oligodeoxynucleotides targeted against human KDR receptor RNA. Cell proliferation (O.D. 490) as a function of antisense oligodeoxynucleotide concentration is shown. KDR 21AS represents a 21 nt phosphorothioate antisense oligodeoxynucleotide targeted against KDR RNA. KDR 21 Scram represents a 21 nt

phosphorothioate oligodeoxynucleotide having a scrambled sequence. LF represents the lipid carrier Lipofectin.

Figure 11 shows *in vitro* cleavage of *flt-1* RNA by hammerhead ribozymes. A) diagrammatic representation of  
5 hammerhead ribozymes targeted against *flt-1* RNA. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining nucleotide positions contain  
10 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH).  
1358 HH-A and 4229 HH-A contain 3 base-paired stem II  
15 region. 1358 HH-B and 4229 HH-B contain 4 base-paired stem II region. B) and C) shows *in vitro* cleavage kinetics of HH ribozymes targeted against sites 1358 and 4229 within the *flt-1* RNA.

Figure 12 shows inhibition of human microvascular  
20 endothelial cell proliferation mediated by anti-*flt-1* hammerhead ribozymes. A) Diagrammatic representation of hammerhead (HH) ribozymes targeted against sites 1358 and 4229 within the the *flt-1* RNA. B) Graphical representation of the inhibition of cell proliferation mediated by  
25 1358HH and 4229HH ribozymes.

Figure 13 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-KDR hammerhead ribozymes. The figure is a graphical representation of the inhibition of cell proliferation mediated by  
30 hammerhead ribozymes targeted against sites 527, 730, 3702 and 3950 within the KDR RNA. Irrelevant HH RZ is a hammerhead ribozyme targeted to an irrelevant target. All of these ribozymes, including the Irrelevant HH RZ, were chemically modified such that the ribozyme consists of  
35 ribose residues at five positions; U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four

nucleotides at the 5' termini contain phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH).

5        Figure 14 shows *in vitro* cleavage of KDR RNA by hammerhead ribozymes. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining nucleotide  
10       positions contain 2'-O-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 726 HH and 527 HH contain 4 base-paired stem II region. Percent  
15       *in vitro* cleavage kinetics as a function of time of HH ribozymes targeted against sites 527 and 726 within the KDR RNA is shown.

      Figure 15 shows *in vitro* cleavage of KDR RNA by hammerhead ribozymes. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of  
20       ribose residues at five positions; U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH). 3702  
25       HH and 3950 HH contain 4 base-paired stem II region. Percent *in vitro* cleavage kinetics as a function of time of HH ribozymes targeted against sites 3702 and 3950 within the KDR RNA is shown.

      Figure 16 shows *in vitro* cleavage of RNA by hammer-  
30       head ribozymes that are targeted to sites that are conserved between *flt-1* and KDR RNA. The hammerhead (HH) ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining  
35       nucleotide positions contain 2'-O-methyl substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (designated as 3'-iH).

FLT/KDR-I HH ribozyme was synthesized with either a 4 base-paired or a 3 base-paired stem II region. FLT/KDR-I HH can cleave site 3388 within *flt-1* RNA and site 3151 within KDR RNA. Percent in vitro cleavage kinetics as a function of time of HH ribozymes targeted against sites 3702 and 3950 within the KDR RNA is shown.

Figure 17 shows inhibition of human microvascular endothelial cell proliferation mediated by anti-KDR and anti-*flt-1* hammerhead ribozymes. The figure is a graphical representation of the inhibition of cell proliferation mediated by hammerhead ribozymes targeted against sites KDR sites-527, 726 or 3950 or *flt-1* site 4229. The figure also shows enhanced inhibition of cell proliferation by a combination of *flt-1* and KDR hammerhead ribozymes. 4229+527, indicates the treatment of cells with both the *flt* 4229 and the KDR 527 ribozymes. 4229+726, indicates the treatment of cells with both the *flt* 4229 and the KDR 726 ribozymes. 4229+3950, indicates the treatment of cells with both the *flt* 4229 and the KDR 3950 ribozymes. VEGF -, indicates the basal level of cell proliferation in the absence of VEGF. A, indicates catalytically active ribozyme; I, indicates catalytically inactive ribozyme. All of these ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' termini contain phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH).

Figure 18 shows the inhibition of VEGF-induced angiogenesis in rat cornea mediated by anti-*flt-1* hammerhead ribozyme. All of these ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 position contains 2'-C-allyl modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' termini contain

phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose (3'-iH). A decrease in the Surface Area corresponds to a reduction in angiogenesis. VEGF alone, corresponds to treatment of the cornea with VEGF and no ribozymes. Vehicle alone, corresponds to the treatment of the cornea with the carrier alone and no VEGF. This control gives a basal level of Surface Area. Active 4229 HH, corresponds to the treatment of cornea with the flt-1 4229 HH ribozyme in the absence of any VEGF. This control also gives a basal level of Surface Area. Active 4229 HH + VEGF, corresponds to the co-treatment of cornea with the flt-1 4229 HH ribozyme and VEGF. Inactive 4229 HH + VEGF, corresponds to the co-treatment of cornea with a catalytically inactive version of 4229 HH ribozyme and VEGF.

### Ribozymes

Ribozymes of this invention block to some extent VEGF-R (specifically flt-1 and flk-1/KDR) production and can be used to treat disease or diagnose such disease. Ribozymes will be delivered to cells in culture, to cells or tissues in animal models of angiogenesis and/or RA and to human cells or tissues ex vivo or in vivo. Ribozyme cleavage of VEGF-R RNAs (specifically RNAs that encode flt-1 and flk-1/KDR) in these systems may alleviate disease symptoms.

### Target sites

Targets for useful ribozymes can be determined as disclosed in Draper et al., International PCT Publication No. WO 95/13380, and hereby incorporated by reference herein in totality. Other examples include the following PCT applications which concern inactivation of expression of disease-related genes: WO 95/23225, WO 95/13380, WO 94/02595, incorporated by reference herein. Rather than repeat the guidance provided in those documents here, below are provided specific examples of such methods, not



limiting to those in the art. Ribozymes to such targets are designed as described in those applications and synthesized to be tested *in vitro* and *in vivo*, as also described.

5       The sequence of human and mouse *flt-1*, *KDR* and/or *flk-1* mRNAs were screened for optimal ribozyme target sites using a computer folding algorithm. Hammerhead or hairpin ribozyme cleavage sites were identified. These sites are shown in Tables II to IX (all sequences are 5' to 3' in the tables; X can be any base-paired sequence, the actual sequence is not relevant here). The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of ribozyme. While mouse and human sequences can be screened and ribozymes there-  
10       after designed, the human targeted sequences are of most utility. However, as discussed in Stinchcomb et al., "Method and Composition for Treatment of Restenosis and Cancer Using Ribozymes," filed May 18, 1994, U.S.S.N. 08/245,466, mouse targeted ribozymes may be useful to test  
15       efficacy of action of the ribozyme prior to testing in humans. The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of ribozyme.

      Hammerhead or hairpin ribozymes were designed that  
25       could bind and cleave target RNA in a sequence-specific manner. The ribozymes were individually analyzed by computer folding (Jaeger et al., 1989 *Proc. Natl. Acad. Sci. USA*, 86, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure.  
30       Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. Varying binding arm lengths can be chosen to optimize activity.

      Referring to Figure 6, mRNA is screened for access-  
35       ible cleavage sites by the method described generally in Draper et al., PCT WO93/23569, hereby incorporated by reference herein. Briefly, DNA oligonucleotides

complementary to potential hammerhead or hairpin ribozyme cleavage sites were synthesized. A polymerase chain reaction is used to generate substrates for T7 RNA polymerase transcription from human and mouse *flt-1*, *KDR* and/or *flk-1* cDNA clones. Labeled RNA transcripts are synthesized in vitro from the templates. The oligonucleotides and the labeled transcripts were annealed, RNaseH was added and the mixtures were incubated for the designated times at 37°C. Reactions are stopped and RNA separated on sequencing polyacrylamide gels. The percentage of the substrate cleaved is determined by autoradiographic quantitation using a PhosphorImaging system. From these data, hammerhead or hairpin ribozyme sites are chosen as the most accessible.

Ribozymes of the hammerhead or hairpin motif were designed to anneal to various sites in the mRNA message. The binding arms are complementary to the target site sequences described above. The ribozymes were chemically synthesized. The method of synthesis used follows the procedure for normal RNA synthesis as described in Usman et al., 1987 *J. Am. Chem. Soc.*, 109, 7845; Scaringe et al., 1990 *Nucleic Acids Res.*, 18, 5433; and Wincott et al., 1995 *Nucleic Acids Res.* 23, 2677-2684 and makes use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. Small scale synthesis were conducted on a 394 Applied Biosystems, Inc. synthesizer using a modified 2.5  $\mu\text{mol}$  scale protocol with a 5 min coupling step for alkylsilyl protected nucleotides and 2.5 min coupling step for 2'-O-methylated nucleotides. Table XI outlines the amounts, and the contact times, of the reagents used in the synthesis cycle. A 6.5-fold excess (163  $\mu\text{L}$  of 0.1 M = 16.3  $\mu\text{mol}$ ) of phosphoramidite and a 24-fold excess of *S*-ethyl tetrazole (238  $\mu\text{L}$  of 0.25 M = 59.5  $\mu\text{mol}$ ) relative to polymer-bound 5'-hydroxyl was used in each coupling cycle. Average coupling yields on the 394 Applied Biosystems, Inc. synthesizer, determined by

colorimetric quantitation of the trityl fractions, were 97.5-99%. Other oligonucleotide synthesis reagents for the 394 Applied Biosystems, Inc. synthesizer: detritylation solution was 2% TCA in methylene chloride (ABI); capping  
5 was performed with 16% *N*-methyl imidazole in THF (ABI) and 10% acetic anhydride/10% 2,6-lutidine in THF (ABI); oxidation solution was 16.9 mM I<sub>2</sub>, 49 mM pyridine, 9% water in THF (Millipore). B & J Synthesis Grade acetonitrile was used directly from the reagent bottle. *S*-Ethyl tetra-  
10 zole solution (0.25 M in acetonitrile) was made up from the solid obtained from American International Chemical, Inc.

Deprotection of the RNA was performed as follows. The polymer-bound oligoribonucleotide, trityl-off, was trans-  
15 ferred from the synthesis column to a 4mL glass screw top vial and suspended in a solution of methylamine (MA) at 65 °C for 10 min. After cooling to -20 °C, the supernatant was removed from the polymer support. The support was washed three times with 1.0 mL of EtOH:MeCN:H<sub>2</sub>O/3:1:1,  
20 vortexed and the supernatant was then added to the first supernatant. The combined supernatants, containing the oligoribonucleotide, were dried to a white powder.

The base-deprotected oligoribonucleotide was resuspended in anhydrous TEA•HF/NMP solution (250 µL of a  
25 solution of 1.5mL *N*-methylpyrrolidinone, 750 µL TEA and 1.0 mL TEA•3HF to provide a 1.4M HF concentration) and heated to 65°C for 1.5 h. The resulting, fully deprotected, oligomer was quenched with 50 mM TEAB (9 mL) prior to anion exchange desalting.

30 For anion exchange desalting of the deprotected oligomer, the TEAB solution was loaded onto a Qiagen 500® anion exchange cartridge (Qiagen Inc.) that was prewashed with 50 mM TEAB (10 mL). After washing the loaded cartridge with 50 mM TEAB (10 mL), the RNA was eluted with  
35 2 M TEAB (10 mL) and dried down to a white powder.

Inactive hammerhead ribozymes were synthesized by substituting a U for G<sub>5</sub> and a U for A<sub>15</sub> (numbering from

Hertel, K. J., et al., 1992, Nucleic Acids Res., 20, 3252).

The average stepwise coupling yields were >98% (Wincott et al., 1995 *Nucleic Acids Res.* 23, 2677-2684).

5        Hairpin ribozymes are synthesized in two parts and annealed to reconstruct the active ribozyme (Chowrira and Burke, 1992 *Nucleic Acids Res.*, 20, 2835-2840). Ribozymes are also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, 10 *Methods Enzymol.* 180, 51).

All ribozymes are modified extensively to enhance stability by modification with nuclease resistant groups, for example, 2'-amino, 2'-C-allyl, 2'-fluoro, 2'-O-methyl, 2'-H (for a review see Usman and Cedergren, 1992 *TIBS* 17, 15 34; Usman et al., 1994 *Nucleic Acids Symp. Ser.* 31, 163). Ribozymes are purified by gel electrophoresis using general methods or are purified by high pressure liquid chromatography (HPLC; See Usman et al., PCT Publication No. WO95/23225, the totality of which is hereby incor- 20 porated herein by reference) and are resuspended in water.

The sequences of the ribozymes that are chemically synthesized, useful in this study, are shown in Tables II to IX. Those in the art will recognize that these sequences are representative only of many more such 25 sequences where the enzymatic portion of the ribozyme (all but the binding arms) is altered to affect activity. Stem-loop IV sequence of hairpin ribozymes listed in for example Table III (5'-CACGUUGUG-3') can be altered (substitution, deletion, and/or insertion) to contain any 30 sequence, provided a minimum of two base-paired stem structure can form. The sequences listed in Tables II to IX may be formed of ribonucleotides or other nucleotides or non-nucleotides. Such ribozymes are equivalent to the ribozymes described specifically in the Tables.

Optimizing Ribozyme Activity

Ribozyme activity can be optimized as described by Stinchcomb et al., supra. The details will not be repeated here, but include altering the length of the  
5 ribozyme binding arms (stems I and III, see Figure 2c), or chemically synthesizing ribozymes with modifications that prevent their degradation by serum ribonucleases (see e.g., Eckstein et al., International Publication No. WO 92/07065; Perrault et al., 1990 Nature 344, 565; Pieken et  
10 al., 1991 Science 253, 314; Usman and Cedergren, 1992 Trends in Biochem. Sci. 17, 334; Usman et al., International Publication No. WO 93/15187; Rossi et al., International Publication No. WO 91/03162; Beigelman et al., 1995 J. Biol Chem. in press; as well as Sproat, US  
15 Patent No. 5,334,711 which describe various chemical modifications that can be made to the sugar moieties of enzymatic RNA molecules). Modifications which enhance their efficacy in cells, and removal of stem II bases to shorten RNA synthesis times and reduce chemical require-  
20 ments are desired. (All these publications are hereby incorporated by reference herein).

Sullivan, et al., supra, describes the general methods for delivery of enzymatic RNA molecules. Ribozymes may be administered to cells by a variety of  
25 methods known to those familiar to the art, including, but not restricted to, encapsulation in liposomes, by iontophoresis, or by incorporation into other vehicles, such as hydrogels, cyclodextrins, biodegradable nanocapsules, and bioadhesive microspheres. For some indications, ribozymes  
30 may be directly delivered ex vivo to cells or tissues with or without the aforementioned vehicles. Alternatively, the RNA/vehicle combination is locally delivered by direct injection or by use of a catheter, infusion pump or stent. Other routes of delivery include, but are not limited to,  
35 intravascular, intramuscular, subcutaneous or joint injection, aerosol inhalation, oral (tablet or pill form), topical, systemic, ocular, intraperitoneal and/or intra-

thecal delivery. More detailed descriptions of ribozyme delivery and administration are provided in Sullivan et al., supra and Draper et al., supra which have been incorporated by reference herein.

5 Another means of accumulating high concentrations of a ribozyme(s) within cells is to incorporate the ribozyme-encoding sequences into a DNA or RNA expression vector. Transcription of the ribozyme sequences are driven from a promoter for eukaryotic RNA polymerase I (pol I), RNA  
10 polymerase II (pol II), or RNA polymerase III (pol III). Transcripts from pol II or pol III promoters will be expressed at high levels in all cells; the levels of a given pol II promoter in a given cell type will depend on the nature of the gene regulatory sequences (enhancers,  
15 silencers, etc.) present nearby. Prokaryotic RNA polymerase promoters are also used, providing that the prokaryotic RNA polymerase enzyme is expressed in the appropriate cells (Elroy-Stein and Moss, 1990 *Proc. Natl. Acad. Sci. U S A*, 87, 6743-7; Gao and Huang 1993 *Nucleic Acids Res.*,  
20 21, 2867-72; Lieber et al., 1993 *Methods Enzymol.*, 217, 47-66; Zhou et al., 1990 *Mol. Cell. Biol.*, 10, 4529-37; Thompson et al., 1995 supra). Several investigators have demonstrated that ribozymes expressed from such promoters can function in mammalian cells (e.g. Kashani-Sabet et  
25 al., 1992 *Antisense Res. Dev.*, 2, 3-15; Ojwang et al., 1992 *Proc. Natl. Acad. Sci. U S A*, 89, 10802-6; Chen et al., 1992 *Nucleic Acids Res.*, 20, 4581-9; Yu et al., 1993 *Proc. Natl. Acad. Sci. U S A*, 90, 6340-4; L'Huillier et al., 1992 *EMBO J.* 11, 4411-8; Lisziewicz et al., 1993  
30 *Proc. Natl. Acad. Sci. U. S. A.*, 90, 8000-4; Thompson et al., 1995 *Nucleic Acids Res.* 23, 2259). The above ribozyme transcription units can be incorporated into a variety of vectors for introduction into mammalian cells, including but not restricted to, plasmid DNA vectors,  
35 viral DNA vectors (such as adenovirus or adeno-associated virus vectors), or viral RNA vectors (such as retroviral or alphavirus vectors).

In a preferred embodiment of the invention, a transcription unit expressing a ribozyme that cleaves RNAs that encode flt-1, KDR and/or flk-1 are inserted into a plasmid DNA vector or an adenovirus or adeno-associated virus DNA viral vector or a retroviral RNA vector. Viral vectors have been used to transfer genes and lead to either transient or long term gene expression (Zabner et al., 1993 Cell 75, 207; Carter, 1992 Curr. Opin. Biotech. 3, 533). The adenovirus, AAV or retroviral vector is delivered as recombinant viral particles. The DNA may be delivered alone or complexed with vehicles (as described for RNA above). The recombinant adenovirus or AAV or retroviral particles are locally administered to the site of treatment, e.g., through incubation or inhalation in vivo or by direct application to cells or tissues ex vivo. Retroviral vectors have also been used to express ribozymes in mammalian cells (Ojwang et al., 1992 supra; Thompson et al., 1995 supra).

flt-1, KDR and/or flk-1 are attractive nucleic acid-based therapeutic targets by several criteria. The interaction between VEGF and VEGF-R is well-established. Efficacy can be tested in well-defined and predictive animal models. Finally, the disease conditions are serious and current therapies are inadequate. Whereas protein-based therapies would inhibit VEGF activity nucleic acid-based therapy provides a direct and elegant approach to directly modulate flt-1, KDR and/or flk-1 expression.

Because flt-1 and KDR mRNAs are highly homologous in certain regions, some ribozyme target sites are also homologous (see Table X). In this case, a single ribozyme will target both flt-1 and KDR mRNAs. At partially homologous sites, a single ribozyme can sometimes be designed to accomodate a site on both mRNAs by including G/U basepairing. For example, if there is a G present in a ribozyme target site in KDR mRNA at the same position there is an A in the flt-1 ribozyme target site, the

ribozyme can be synthesized with a U at the complementary position and it will bind both to sites. The advantage of one ribozyme that targets both VEGF-R mRNAs is clear, especially in cases where both VEGF receptors may contribute to the progression of angiogenesis in the disease state.

"Angiogenesis" refers to formation of new blood vessels which is an essential process in reproduction, development and wound repair. "Tumor angiogenesis" refers to the induction of the growth of blood vessels from surrounding tissue into a solid tumor. Tumor growth and tumor metastasis are dependent on angiogenesis (for a review see Folkman, 1985 *supra*; Folkman 1990 *J. Natl. Cancer Inst.*, 82, 4; Folkman and Shing, 1992 *J. Biol. Chem.* 267, 10931).

Angiogenesis plays an important role in other diseases such as arthritis wherein new blood vessels have been shown to invade the joints and degrade cartilage (Folkman and Shing, *supra*).

"Retinopathy" refers to inflammation of the retina and/or degenerative condition of the retina which may lead to occlusion of the retina and eventual blindness. In "diabetic retinopathy" angiogenesis causes the capillaries in the retina to invade the vitreous resulting in bleeding and blindness which is also seen in neonatal retinopathy (for a review see Folkman, 1985 *supra*; Folkman 1990 *supra*; Folkman and Shing, 1992 *supra*).

#### Example 1: flt-1, KDR and/or flk-1 ribozymes

By engineering ribozyme motifs applicant has designed several ribozymes directed against flt-1, KDR and/or flk-1 encoded mRNA sequences. These ribozymes were synthesized with modifications that improve their nuclease resistance (Beigelman et al., 1995 *J Biol. Chem.* 270, 25702) and enhance their activity in cells. The ability of ribozymes to cleave target sequences *in vitro* was evaluated essentially as described in Thompson et al., PCT Publication



No. WO 93/23057; Draper et al., PCT Publication No. WO 95/04818.

Example 2: Effect of ribozymes on the binding of VEGF to flt-1, KDR and/or flk-1 receptors

5        Several common human cell lines are available that express endogenous flt-1, KDR and/or flk-1. flt-1, KDR and/or flk-1 can be detected easily with monoclonal antibodies. Use of appropriate fluorescent reagents and fluorescence-activated cell-sorting (FACS) will permit  
10    direct quantitation of surface flt-1, KDR and/or flk-1 on a cell-by-cell basis. Active ribozymes are expected to directly reduce flt-1, KDR and/or flk-1 expression and thereby reduce VEGF binding to the cells. In this example, human umbilical cord microvascular endothelial  
15    cells were used.

Cell Preparation:

Plates are coated with 1.5% gelatin and allowed to stand for one hour. Cells (e.g., microvascular endothelial cells derived from human umbilical cord vein) are  
20    plated at 20,000 cells/well (24 well plate) in 200 ml growth media and incubated overnight (~ 1 doubling) to yield ~40,000 cells (75-80% confluent).

Ribozyme treatment:

Media is removed from cells and the cells are washed  
25    two times with 300 ml 1X PBS: Ca<sup>2+</sup>: Mg<sup>2+</sup> mixture. A complex of 200-500 nM ribozyme and LipofectAMINE® (3:1 lipid: phosphate ratio) in 200 ml OptiMEM® (5% FBS) was added to the cells. The cells are incubated for 6 hr (equivalent to 2-3 VEGF-R turnovers).

30    <sup>125</sup>I VEGF binding assay:

The assay is carried out on ice to inhibit internalization of VEGF during the experiment. The media containing the ribozyme is removed from the cells and the cells

are washed twice with with 300 ml 1X PBS:  $\text{Ca}^{2+}$ :  $\text{Mg}^{2+}$  mixture containing 1% BSA. Appropriate  $^{125}\text{I}$  VEGF solution (100,000 cpm/well, +/- 10 X cold 1X PBS, 1% BSA) was applied to the cells. The cells are incubated on ice for 5 1 h.  $^{125}\text{I}$  VEGF-containing solution is removed and the cells are washed three times with with 300 ml 1X PBS:  $\text{Ca}^{2+}$ :  $\text{Mg}^{2+}$  mixture containing 1% BSA. To each well 300 ml of 100 mM Tris-HCl, pH 8.0, 0.5% Triton X-100 was added and the the mixture was incubated for 2 min. The  $^{125}\text{I}$  VEGF-binding was 10 quantitated using standard scintillation counting techniques. Percent inhibition was calculated as follows:

Percent Inhibition =

$$\frac{\text{cpm } ^{125}\text{I VEGF bound by the ribozyme-treated samples}}{\text{cpm } ^{125}\text{I VEGF bound by the Control sample}} \times 100$$

15 Example 3: Effect of hammerhead ribozymes targeted against flt-1 receptor on the binding of VEGF

Hammerhead ribozymes targeted to twenty sites within flt-1 RNA were synthesized as described above. Sequence of the ribozymes used are shown in Table II; the length of 20 stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'- $\text{NH}_2$  modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate 25 substitutions. Additionally, 3' end of the ribozyme contains a 3'-3' linked inverted abasic ribose.

Referring to Figure 7, the effect of hammerhead ribozymes targeted against flt-1 receptor on the binding 30 of VEGF to flt-1 on the surface of human microvascular endothelial cells is shown. The majority of the ribozymes tested were able to inhibit the expression of flt-1 and thereby were able to inhibit the binding of VEGF.

In order to determine the specificity of ribozymes 35 targeted against flt-1 RNA, the effect of five anti-flt-1 ribozymes on the binding of VEGF, UPA (urokinase plasmino-

gen activator) and FGF (fibroblast growth factor) to their corresponding receptors were assayed. As shown in Figure 9, there was significant inhibition of VEGF binding to its receptors on cells treated with anti-flt-1 ribozymes. There was no specific inhibition of the binding of UPA and FGF to their corresponding receptors. These data strongly suggest that anti-flt-1 ribozymes specifically cleave flt-1 RNA and not RNAs encoding the receptors for UPA and FGF, resulting in the inhibition of flt-1 receptor expression on the surface of the cells. Thus the ribozymes are responsible for the inhibition of VEGF binding but not the binding of UPA and FGF.

Example 4: Effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF

Hammerhead ribozymes targeted to twenty one sites within KDR RNA were synthesized as described above. Sequence of the ribozymes used are shown in Table IV; the length of stem II region is 3 bp. The hammerhead ribozymes were chemically modified such that the ribozyme consists of ribose residues at five positions; U4 and U7 positions contain 2'-NH<sub>2</sub> modifications, the remaining nucleotide positions contain 2'-O-methyl substitutions; four nucleotides at the 5' terminus contains phosphorothioate substitutions. Additionally, the 3' end of the ribozyme contains a 3'-3' linked inverted abasic deoxyribose.

Referring to Figure 8, the effect of hammerhead ribozymes targeted against KDR receptor on the binding of VEGF to KDR on the surface of human microvascular endothelial cells is shown. A majority of the ribozymes tested were able to inhibit the expression of KDR and thereby were able to inhibit the binding of VEGF. As a control, the cells were treated with a ribozyme that is not targeted towards KDR RNA (irrel. RZ); there was no specific inhibition of VEGF binding. The results from this control experiment strongly suggest that the inhibi-

tion of VEGF binding observed with anti-KDR ribozymes is a ribozyme-mediated inhibition.

Example 5: Effect of ribozymes targeted against VEGF receptors on cell proliferation

5 Cell Preparation:

24-well plates are coated with 1.5% gelatin (porcine skin 300 bloom). After 1 hr, excess gelatin is washed off of the plate. Microvascular endothelial cells are plated at 5,000 cells/well (24 well plate) in 200 ml growth  
10 media. The cells are allowed to grow for ~ 18 hr (~ 1 doubling) to yield ~10,000 cells (25-30% confluent).

Ribozyme treatment:

Media is removed from the cells, and the cells are washed two times with 300 ml 1X PBS:  $\text{Ca}^{2+}$ :  $\text{Mg}^{2+}$  mixture.

15 For anti-flt-1 HH ribozyme experiment (Figure 12) a complex of 500 nM ribozyme; 15 mM LFA (3:1 lipid:phosphate ratio) in 200 ml OptiMEM (5% FCS) media was added to the cells. Incubation of cells is carried out for 6 hr (equivalent to 2-3 VEGF receptor turnovers).

20 For anti-KDR HH ribozyme experiment (Figure 13) a complex of 200 nM ribozyme; 5.25 mM LFA (3:1 lipid:phosphate ratio) in 200 ml OptiMEM (5% FCS) media was added to the cells. Incubation of cells is carried out for 3 hr.

25 Proliferation:

After three or six hours, the media is removed from the cells and the cells are washed with 300 ml 1X PBS:  $\text{Ca}^{2+}$ :  $\text{Mg}^{2+}$  mixture. Maintenance media (contains dialyzed 10% FBS) +/- VEGF or basic FGF at 10 ng/ml is added to the  
30 cells. The cells are incubated for 48 or 72 h. The cells are trypsinized and counted (Coulter counter). Trypan blue is added on one well of each treatment as control.

As shown in Figure 12B, VEGF and basic FGF can stimulate human microvascular endothelial cell proliferation. However, treatment of cells with 1358 HH or 4229 HH ribozymes, targeted against *flt-1* mRNA, results in a significant decrease in the ability of VEGF to stimulate endothelial cell proliferation. These ribozymes do not inhibit the FGF-mediated stimulation of endothelial cell proliferation.

Human microvascular endothelial cells were also treated with hammerhead ribozymes targeted against sites 527, 730, 3702 or 3950 within the KDR mRNA. As shown in Figure 13, all four ribozymes caused significant inhibition of VEGF-mediated induction of cell proliferation. No significant inhibition of cell proliferation was observed when the cells were treated with a hammerhead ribozyme targeted to an irrelevant RNA. Additionally, none of the ribozymes inhibited FGF-mediated stimulation of cell proliferation.

These results strongly suggest that hammerhead ribozymes targeted against either *flt-1* or KDR mRNA can specifically inhibit VEGF-mediated induction of endothelial cell proliferation.

Example 6: Effect of antisense oligonucleotides targeted against VEGF receptors on cell proliferation (colorimetric assay)

Following are some of the reagents used in the proliferation assay:

Cells: Human aortic endothelial cells (HAEC) from Clonetics®. Cells at early passage are preferably used.

Uptake Medium: EBM (from Clonetics®); 1% L-Glutamine; 20 mM Hepes; No serum; No antibiotics.

Growth Medium: EGM (from Clonetics®); FBS to 20%; 1% L-Glutamine; 20 mM Hepes.

Cell Plating: 96-well tissue culture plates are coated with 0.2% gelatin (50 ml/well). The gelatin is incubated in the wells at room temperature for 15-30

minutes. The gelatin is removed by aspiration and the wells are washed with PBS:Ca<sup>2+</sup>: Mg<sup>2+</sup> mixture. PBS mixture is left in the wells until cells are ready to be added. HAEC cells were detached by trypsin treatment and resuspended at 1.25 x 10<sup>4</sup>/ml in growth medium. PBS is removed from plates and 200 ml of cells (i.e. 2.5 x 10<sup>3</sup> cells/well) are added to each well. The cells are allowed to grow for 48 hours before the proliferation assay.

Assay: Growth medium is removed from the wells. The cells are washed twice with PBS:Ca<sup>2+</sup>: Mg<sup>2+</sup> mixture without antibiotics. A formulation of lipid/antisense oligonucleotide (antisense oligonucleotide is used here as a non-limiting example) complex is added to each well (100 ml/well) in uptake medium. The cells are incubated for 2-3 hours at 37°C in CO<sub>2</sub> incubator. After uptake, 100 ml/well of growth medium is added (gives final FBS concentration of 10%). After approximately 72 hours, 40 ml MTS<sup>®</sup> stock solution (made as described by manufacturer) was added to each well and incubated at 37°C for 1-3 hours, depending on the color development. (For this assay, 2 hours was sufficient). The intensity of color formation was determined on a plate reader at 490 nm.

Phosphorothioate-substituted antisense oligodeoxynucleotides were custom synthesized by The Midland Certified Reagent Company<sup>®</sup>, Midland, Texas. Following non-limiting antisense oligodeoxynucleotides targeted against KDR RNA were used in the proliferation assay:

KDR 21 AS: 5'-GCA GCA CCT TGC TCT CCA TCC-3'

SCRAMBLED CONTROL: 5'-CTG CCA ACT TCC CAT GCC TGC-3'

As shown in Figure 10, proliferation of HAEC cells are specifically inhibited by increasing concentrations of the phosphorothioate anti-KDR-antisense oligodeoxynucleotide. The scrambled antisense oligonucleotide is not expected to bind the KDR RNA and therefore is not expected to inhibit KDR expression. As expected, there is no detectable inhibition of proliferation of HAEC cells

treated with a phosphorothioate antisense oligonucleotide with scrambled sequence.

Example 7: In vitro cleavage of flt-1 RNA by hammerhead ribozymes

5 Referring to Figure 11A, hammerhead ribozymes (HH) targeted against sites 1358 and 4229 within the flt-1 RNA were synthesized as described above.

RNA cleavage assay in vitro:

Substrate RNA was 5' end-labeled using [ $\gamma$ - $^{32}$ P] ATP and  
10 T4 polynucleotide kinase (US Biochemicals). Cleavage reactions were carried out under ribozyme "excess" conditions. Trace amount ( $\leq 1$  nM) of 5' end-labeled substrate and 40 nM unlabeled ribozyme were denatured and renatured separately by heating to 90°C for 2 min and snap-cooling  
15 on ice for 10-15 min. The ribozyme and substrate were incubated, separately, at 37°C for 10 min in a buffer containing 50 mM Tris-HCl and 10 mM MgCl<sub>2</sub>. The reaction was initiated by mixing the ribozyme and substrate solutions and incubating at 37°C. Aliquots of 5 ml are taken  
20 at regular intervals of time and the reaction is quenched by mixing with equal volume of 2X formamide stop mix. The samples are resolved on 20 % denaturing polyacrylamide gels. The results were quantified and percentage of target RNA cleaved is plotted as a function of time.

25 Referring to Figure 11B and 11C, hammerhead ribozymes targeted against sites 1358 and 4229 within the flt-1 RNA are capable of cleaving target RNA efficiently in vitro.

Example 8: In vitro cleavage of KDR RNA by hammerhead ribozymes

30 In this non-limiting example, hammerhead ribozymes targeted against sites 726, 527, 3702 and 3950 within KDR RNA were synthesized as described above. RNA cleavage reactions were carried out in vitro essentially as described under Example 7.

Referring to Figures 14 and 15, all four ribozymes were able to cleave their cognate target RNA efficiently in a sequence-specific manner.

5 Example 9: In vitro cleavage of RNA by hammerhead ribozymes targeted against cleavage sites that are homologous between KDR and flt-1 mRNA

Because flt-1 and KDR mRNAs are highly homologous in certain regions, some ribozyme target sites are also homologous (see Table X). In this case, a single ribozyme will target both flt-1 and KDR mRNAs. Hammerhead ribozyme (FLT/KDR-I) targeted against one of the homologous sites between flt-1 and KDR (flt-1 site 3388 and KDR site 3151) was synthesized as described above. Ribozymes with either a 3 bp stem II or a 4 bp stem II were synthesized. RNA cleavage reactions were carried out in vitro essentially as described under Example 7.

Referring to Figure 16, FLT/KDR-I ribozyme with either a 3 or a 4 bp stem II was able to cleave its target RNA efficiently in vitro.

20 Example 10: Effect of multiple ribozymes targeted against both flt-1 and KDR RNA on cell proliferation

Since both flt-1 and KDR receptors of VEGF are involved in angiogenesis, the inhibition of the expression of both of these genes may be an effective approach to inhibit angiogenesis.

Human microvascular endothelial cells were treated with hammerhead ribozymes targeted against sites flt-1 4229 alone, KDR 527 alone, KDR 726 alone, KDR 3950 alone, flt-1 4229 + KDR 527, flt-1 4229 + KDR 726 or flt-1 4229 + KDR 3950. As shown in Figure 17, all the combinations of active ribozymes (A) caused significant inhibition of VEGF-mediated induction of cell proliferation. No significant inhibition of cell proliferation was observed when the cells were treated with a catalytically inactive (I) hammerhead ribozymes. Additionally, cells treated



with ribozymes targeted against both *flt-1* and *KDR* RNAs-  
*flt-1* 4229 + *KDR* 527; *flt-1* 4229 + *KDR* 726; *flt-1* 4229 +  
*KDR* 3950, were able to cause a greater inhibition of  
VEGF-mediated induction of cell proliferation when  
5 compared with individual ribozymes targeted against either  
*flt-1* or *KDR* RNA (see *flt-1* 4229 alone; *KDR* 527 alone; *KDR*  
726 alone; *KDR* 3950 alone). This strongly suggests that  
treatment of cells with multiple ribozymes may be a more  
effective means of inhibition of gene expression.

#### 10 Animal Models

There are several animal models in which the  
anti-angiogenesis effect of nucleic acids of the present  
invention, such as ribozymes, directed against VEGF-R  
mRNAs can be tested. Typically a corneal model has been  
15 used to study angiogenesis in rat and rabbit since  
recruitment of vessels can easily be followed in this  
normally avascular tissue (Pandey et al., 1995 *Science*  
268: 567-569). In these models, a small Teflon or Hydrion  
disk pretreated with an angiogenesis factor (e.g. bFGF or  
20 VEGF) is inserted into a pocket surgically created in the  
cornea. Angiogenesis is monitored 3 to 5 days later.  
Ribozymes directed against VEGF-R mRNAs would be delivered  
in the disk as well, or dropwise to the eye over the time  
course of the experiment. In another eye model, hypoxia  
25 has been shown to cause both increased expression of VEGF  
and neovascularization in the retina (Pierce et al., 1995  
*Proc. Natl. Acad. Sci. USA.* 92: 905-909; Shweiki et al.,  
1992 *J. Clin. Invest.* 91: 2235-2243).

In human glioblastomas, it has been shown that VEGF  
30 is at least partially responsible for tumor angiogenesis  
(Plate et al., 1992 *Nature* 359, 845). Animal models have  
been developed in which glioblastoma cells are implanted  
subcutaneously into nude mice and the progress of tumor  
growth and angiogenesis is studied (Kim et al., 1993  
35 *supra*; Millauer et al., 1994 *supra*).

Another animal model that addresses neovascularization involves Matrigel, an extract of basement membrane that becomes a solid gel when injected subcutaneously (Passaniti et al., 1992 *Lab. Invest.* 67: 519-528). When  
5 the Matrigel is supplemented with angiogenesis factors such as VEGF, vessels grow into the Matrigel over a period of 3 to 5 days and angiogenesis can be assessed. Again, ribozymes directed against VEGF-R mRNAs would be delivered in the Matrigel.

10 Several animal models exist for screening of anti-angiogenic agents. These include corneal vessel formation following corneal injury (Burger et al., 1985 *Cornea* 4: 35-41; Lepri, et al., 1994 *J. Ocular Pharmacol.* 10: 273-280; Ormerod et al., 1990 *Am. J. Pathol.* 137: 1243-1252)  
15 or intracorneal growth factor implant (Grant et al., 1993 *Diabetologia* 36: 282-291; Pandey et al. 1995 *supra*; Zieche et al., 1992 *Lab. Invest.* 67: 711-715), vessel growth into Matrigel matrix containing growth factors (Passaniti et al., 1992 *supra*), female reproductive organ neovasculari-  
20 zation following hormonal manipulation (Shweiki et al., 1993 *Clin. Invest.* 91: 2235-2243), several models involving inhibition of tumor growth in highly vascularized solid tumors (O'Reilly et al., 1994 *Cell* 79: 315-328; Senger et al., 1993 *Cancer and Metas. Rev.* 12: 303-324;  
25 Takahasi et al., 1994 *Cancer Res.* 54: 4233-4237; Kim et al., 1993 *supra*), and transient hypoxia-induced neovascularization in the mouse retina (Pierce et al., 1995 *Proc. Natl. Acad. Sci. USA.* 92: 905-909).

The cornea model, described in Pandey et al. *supra*,  
30 is the most common and well characterized anti-angiogenic agent efficacy screening model. This model involves an avascular tissue into which vessels are recruited by a stimulating agent (growth factor, thermal or alkali burn, endotoxin). The corneal model would utilize the intra-  
35 stromal corneal implantation of a Teflon pellet soaked in a VEGF-Hydrion solution to recruit blood vessels toward the pellet which can be quantitated using standard microscopic

and image analysis techniques. To evaluate their anti-angiogenic efficacy, ribozymes are applied topically to the eye or bound within Hydron on the Teflon pellet itself. This avascular cornea as well as the Matrigel  
5 (see below) provide for low background assays. While the corneal model has been performed extensively in the rabbit, studies in the rat have also been conducted.

The mouse model (Passaniti et al., *supra*) is a non-tissue model which utilizes Matrigel, an extract of  
10 basement membrane (Kleinman et al., 1986) or Millipore® filter disk, which can be impregnated with growth factors and anti-angiogenic agents in a liquid form prior to injection. Upon subcutaneous administration at body temperature, the Matrigel or Millipore® filter disk forms  
15 a solid implant. VEGF embedded in the Matrigel or Millipore® filter disk would be used to recruit vessels within the matrix of the Matrigel or Millipore® filter disk which can be processed histologically for endothelial cell specific vWF (factor VIII antigen) immunohisto-  
20 chemistry, Trichrome-Masson stain, or hemoglobin content. Like the cornea, the Matrigel or Millipore® filter disk are avascular; however, it is not tissue. In the Matrigel or Millipore® filter disk model, ribozymes are administered within the matrix of the Matrigel or Millipore®  
25 filter disk to test their anti-angiogenic efficacy. Thus, delivery issues in this model, as with delivery of ribozymes by Hydron-coated Teflon pellets in the rat cornea model, may be less problematic due to the homogeneous presence of the ribozyme within the respective matrix.

30 These models offer a distinct advantage over several other angiogenic models listed previously. The ability to use VEGF as a pro-angiogenic stimulus in both models is highly desirable since ribozymes will target only VEGFr mRNA. In other words, the involvement of other non-  
35 specific types of stimuli in the cornea and Matrigel models is not advantageous from the standpoint of understanding the pharmacologic mechanism by which the

anti-VEGFr mRNA ribozymes produce their effects. In addition, the models will allow for testing the specificity of the anti-VEGFr mRNA ribozymes by using either a- or bFGF as a pro-angiogenic factor. Vessel recruitment using FGF  
5 should not be affected in either model by anti-VEGFr mRNA ribozymes. Other models of angiogenesis including vessel formation in the female reproductive system using hormonal manipulation (Shweiki et al., 1993 *supra*); a variety of vascular solid tumor models which involve indirect correlations with angiogenesis (O'Reilly et al., 1994 *supra*;  
10 Senger et al., 1993 *supra*; Takahashi et al., 1994 *supra*; Kim et al., 1993 *supra*); and retinal neovascularization following transient hypoxia (Pierce et al., 1995 *supra*) were not selected for efficacy screening due to their  
15 non-specific nature, although there is a correlation between VEGF and angiogenesis in these models.

Other model systems to study tumor angiogenesis is reviewed by Folkman, 1985 *Adv. Cancer. Res.* 43, 175.

flt-1, KDR and/or flk-1 protein levels can be  
20 measured clinically or experimentally by FACS analysis. flt-1, KDR and/or flk-1 encoded mRNA levels will be assessed by Northern analysis, RNase-protection, primer extension analysis and/or quantitative RT-PCR. Ribozymes that block flt-1, KDR and/or flk-1 protein encoding mRNAs  
25 and therefore result in decreased levels of flt-1, KDR and/or flk-1 activity by more than 20% in vitro will be identified.

Ribozymes and/or genes encoding them are delivered by either free delivery, liposome delivery, cationic lipid  
30 delivery, adeno-associated virus vector delivery, adeno-virus vector delivery, retrovirus vector delivery or plasmid vector delivery in these animal model experiments (see above).

Patients can be treated by locally administering  
35 nucleic acids targeted against VEGF-R by direct injection. Routes of administration may include, but are not limited to, intravascular, intramuscular, subcutaneous, intra-

articular, aerosol inhalation, oral (tablet, capsule or pill form), topical, systemic, ocular, intraperitoneal and/or intrathecal delivery.

Example 11: Ribozyme-mediated inhibition of angiogenesis  
5 in vivo

The purpose of this study was to assess the anti-angiogenic activity of hammerhead ribozymes targeted against flt-1 4229 site in the rat cornea model of VEGF induced angiogenesis (see above). These ribozymes have  
10 either active or inactive catalytic core and either bind and cleave or just bind to VEGF-R mRNA of the flt-1 subtype. The active ribozymes, that are able to bind and cleave the target RNA, have been shown to inhibit (<sup>125</sup>I-labeled) VEGF binding in cultured endothelial cells  
15 and produce a dose-dependent decrease in VEGF induced endothelial cell proliferation in these cells (see Examples 3-5 above). The catalytically inactive forms of these ribozymes, wherein the ribozymes can only bind to the RNA but cannot catalyze RNA cleavage, fail to show  
20 these characteristics. The ribozymes and VEGF were co-delivered using the filter disk method: Nitrocellulose filter disks (Millipore®) of 0.057 diameter were immersed in appropriate solutions and were surgically implanted in rat cornea as described by Pandey et al., supra. This  
25 delivery method has been shown to deliver rhodamine-labeled free ribozyme to scleral cells and, in all likelihood cells of the pericorneal vascular plexus. Since the active ribozymes show cell culture efficacy and can be delivered to the target site using the disk method,  
30 it is essential that these ribozymes be assessed for in vivo anti-angiogenic activity.

The stimulus for angiogenesis in this study was the treatment of the filter disk with 30 mM VEGF which is implanted within the cornea's stroma. This dose yields  
35 reproducible neovascularization stemming from the pericorneal vascular plexus growing toward the disk in a

dose-response study 5 days following implant. Filter disks treated only with the vehicle for VEGF show no angiogenic response. The ribozymes was co-administered with VEGF on a disk in two different ribozyme concentrations. One concern with the simultaneous administration is that the ribozymes will not be able to inhibit angiogenesis since VEGF receptors can be stimulated. However, we have observed that in low VEGF doses, the neovascular response reverts to normal suggesting that the VEGF stimulus is essential for maintaining the angiogenic response. Blocking the production of VEGF receptors using simultaneous administration of anti-VEGF-R mRNA ribozymes could attenuate the normal neovascularization induced by the filter disk treated with VEGF.

#### 15 Materials and Methods:

##### 1. Stock hammerhead ribozyme solutions:

- a. flt-1 4229 (786  $\mu$ M) - Active
- b. flt-1 4229 (736  $\mu$ M) - Inactive

##### 2. Experimental solutions/groups:

- |    |         |            |   |
|----|---------|------------|---|
| 20 | Group 1 | Solution 1 | Control VEGF solution: 30 $\mu$ M in 82mM Tris base                 |
|    | Group 2 | Solution 2 | flt-1 4229 (1 $\mu$ g/ $\mu$ L) in 30 $\mu$ M VEGF/82 mM Tris base  |
|    | Group 3 | Solution 3 | flt-1 4229 (10 $\mu$ g/ $\mu$ L) in 30 $\mu$ M VEGF/82 mM Tris base |
| 25 | Group 4 | Solution 4 | No VEGF, flt-1 4229 (10 $\mu$ g/ $\mu$ L) in 82 mM Tris base        |
|    | Group 5 | Solution 5 | No VEGF, No ribozyme in 82 mM Tris base                             |
- 30 10 eyes per group, 5 animals (Since they have similar molecular weights, the molar concentrations should be essentially similar).

Each solution (VEGF and RIBOZYMES) were prepared as a 2X solution for 1:1 mixing for final concentrations

above, with the exception of solution 1 in which VEGF was 2X and diluted with ribozyme diluent (sterile water).

### 3. VEGF Solutions

The 2X VEGF solution (60  $\mu$ M) was prepared from a stock of 0.82  $\mu$ g/ $\mu$ L in 50 mM Tris base. 200  $\mu$ L of VEGF stock was concentrated by speed vac to a final volume of 60.8  $\mu$ L, for a final concentration of 2.7  $\mu$ g/ $\mu$ L or 60  $\mu$ M. Six 10  $\mu$ L aliquots was prepared for daily mixing. 2X solutions for VEGF and Ribozyme was stored at 4°C until the day of the surgery. Solutions were mixed for each day of surgery. Original 2X solutions was prepared on the day before the first day of the surgery.

### 4. Surgical Solutions:

#### Anesthesia:

stock ketamine hydrochloride 100 mg/mL  
stock xylazine hydrochloride 20 mg/mL  
stock acepromazine 10 mg/mL

Final anesthesia solution: 50 mg/mL ketamine, 10 mg/mL xylazine, and 0.5 mg/mL acepromazine  
5% povidone iodine for ophthalmic surgical wash  
2% lidocaine (sterile) for ophthalmic administration (2 drops per eye)  
sterile 0.9% NaCl for ophthalmic irrigation

### 5. Surgical Methods:

Standard surgical procedure as described in Pandey et al., *supra*. Filter disks were incubated in 1  $\mu$ L of each solution for approximately 30 minutes prior to implantation.

### 5. Experimental Protocol:

The animal cornea were treated with the treatment groups as described above. Animals were allowed to recover for 5 days after treatment with daily observation (scoring 0 - 3). On the fifth day animals were euthanized and

digital images of each eye was obtained for quantitaion using Image Pro Plus. Quantitated neovascular surface area were analyzed by ANOVA followed by two post-hoc tests including Dunnets and Tukey-Kramer tests for significance at the 95% confidence level. Dunnets provide information on the significance between the differences within the means of treatments vs. controls while Tukey-Kramer provide information on the significance of differences within the means of each group.

Results are graphically represented in Figure 18. As shown in the figure, flt-1 4229 active hammerhead ribozyme at both concentrations was effective at inhibiting angiogenesis while the inactive ribozyme did not show any significant reduction in angiogenesis. A statistically significant reduction in neovascular surface area was observed only with active ribozymes. This result clearly shows that the ribozymes are capable of significantly inhibiting angiogenesis in vivo. Specifically, the mechanism of inhibition appears to be by the binding and cleavage of target RNA by ribozymes.

#### Diagnostic uses

Ribozymes of this invention may be used as diagnostic tools to examine genetic drift and mutations within diseased cells or to detect the presence of flt-1, KDR and/or flk-1 RNA in a cell. The close relationship between ribozyme activity and the structure of the target RNA allows the detection of mutations in any region of the molecule which alters the base-pairing and three-dimensional structure of the target RNA. By using multiple ribozymes described in this invention, one may map nucleotide changes which are important to RNA structure and function in vitro, as well as in cells and tissues. Cleavage of target RNAs with ribozymes may be used to inhibit gene expression and define the role (essentially) of specified gene products in the progression of disease. In this manner, other genetic targets



may be defined as important mediators of the disease. These experiments will lead to better treatment of the disease progression by affording the possibility of combinational therapies (e.g., multiple ribozymes targeted  
5 to different genes, ribozymes coupled with known small molecule inhibitors, or intermittent treatment with combinations of ribozymes and/or other chemical or biological molecules). Other in vitro uses of ribozymes of this invention are well known in the art, and include  
10 detection of the presence of mRNAs associated with flt-1, KDR and/or flk-1 related condition. Such RNA is detected by determining the presence of a cleavage product after treatment with a ribozyme using standard methodology.

In a specific example, ribozymes which can cleave  
15 only wild-type or mutant forms of the target RNA are used for the assay. The first ribozyme is used to identify wild-type RNA present in the sample and the second ribozyme will be used to identify mutant RNA in the sample. As reaction controls, synthetic substrates of both wild-  
20 type and mutant RNA will be cleaved by both ribozymes to demonstrate the relative ribozyme efficiencies in the reactions and the absence of cleavage of the "non-targeted" RNA species. The cleavage products from the synthetic substrates will also serve to generate size  
25 markers for the analysis of wild-type and mutant RNAs in the sample population. Thus each analysis will require two ribozymes, two substrates and one unknown sample which will be combined into six reactions. The presence of cleavage products will be determined using an RNase pro-  
30 tection assay so that full-length and cleavage fragments of each RNA can be analyzed in one lane of a polyacrylamide gel. It is not absolutely required to quantify the results to gain insight into the expression of mutant RNAs and putative risk of the desired phenotypic changes in  
35 target cells. The expression of mRNA whose protein product is implicated in the development of the phenotype (i.e., flt-1, KDR and/or flk-1) is adequate to establish

risk. If probes of comparable specific activity are used for both transcripts, then a qualitative comparison of RNA levels will be adequate and will decrease the cost of the initial diagnosis. Higher mutant form to wild-type ratios  
5 will be correlated with higher risk whether RNA levels are compared qualitatively or quantitatively.

Other embodiments are within the following claims.

Table ICharacteristics of RibozymesGroup I Introns

Size: ~200 to >1000 nucleotides

- 5 Requires a U in the target sequence immediately 5' of the cleavage site.

Binds 4-6 nucleotides at 5' side of cleavage site.

Over 75 known members of this class. Found in *Tetrahymena thermophila* rRNA, fungal mitochondria, chloroplasts, phage

- 10 T4, blue-green algae, and others.

RNaseP RNA (M1 RNA)

Size: ~290 to 400 nucleotides

RNA portion of a ribonucleoprotein enzyme. Cleaves tRNA precursors to form mature tRNA.

- 15 Roughly 10 known members of this group all are bacterial in origin.

Hammerhead Ribozyme

Size: ~13 to 40 nucleotides.

- 20 Requires the target sequence UH immediately 5' of the cleavage site.

Binds a variable number of nucleotides on both sides of the cleavage site.

- 14 known members of this class. Found in a number of plant pathogens (virusoids) that use RNA as the infectious agent (Figure 1 and 2)
- 25

Hairpin Ribozyme

Size: ~50 nucleotides.

Requires the target sequence GUC immediately 3' of the cleavage site.

- 30 Binds 4-6 nucleotides at 5' side of the cleavage site and a variable number to the 3' side of the cleavage site.

Only 3 known member of this class. Found in three plant pathogen (satellite RNAs of the tobacco ringspot virus,

arabis mosaic virus and chicory yellow mottle virus) which uses RNA as the infectious agent (Figure 3).

#### Hepatitis Delta Virus (HDV) Ribozyme

Size: 50-60 nucleotides (at present)

5 Sequence requirements not fully determined.

Binding sites and structural requirements not fully determined, although no sequences 5' of cleavage site are required.

Only 1 known member of this class. Found in human HDV  
10 (Figure 4).

#### Neurospora VS RNA Ribozyme

Size: ~144 nucleotides (at present)

Cleavage of target RNAs recently demonstrated.

Sequence requirements not fully determined.

15 Binding sites and structural requirements not fully determined. Only 1 known member of this class. Found in *Neurospora* VS RNA (Figure 5).

#### Table II: Human flt1 VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

20	nt.	HH Ribozyme	Substrate
	Posi-		
	tion		
	10	GCCGAGAG CUGAUGA X GAA AGUGUCCG	CGGACACUC CUCUCGGC
	13	GGAGCCGA CUGAUGA X GAA AGGAGUGU	ACACUCCUC UCGGCUCC
25	15	GAGGAGCC CUGAUGA X GAA AGAGGAGU	ACUCCUCUC GGCUCCUC
	20	CCGGGGAG CUGAUGA X GAA AGCCGAGA	UCUCGGCUC CUCCCCGG
	23	CUGCCGGG CUGAUGA X GAA AGGAGCCG	CGGCUCCUC CCCGGCAG
	43	CCCGCUCC CUGAUGA X GAA AGCCGCCG	CGGCGGCUC GGAGCGGG
	54	GAGCCCCG CUGAUGA X GAA AGCCCCGU	AGCGGGCUC CGGGGCUC
30	62	CUGCACCC CUGAUGA X GAA AGCCCCGG	CCGGGGCUC GGGUGCAG
	97	CCCCGGGU CUGAUGA X GAA AUCCUCGC	GCGAGGAUU ACCCGGGG
	98	UCCCCGGG CUGAUGA X GAA AAUCCUCG	CGAGGAUUA CCCGGGGA

113	CAGGAGAC	CUGAUGA	X	GAA	ACCACUUC	GAAGUGGUU	GUCUCCUG
116	AGCCAGGA	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUC	UCCUGGCU
118	CCAGCCAG	CUGAUGA	X	GAA	AGACAACC	GGUUGUCUC	CUGGCUGG
145	CGCGCCCU	CUGAUGA	X	GAA	AGCGCCCG	CGGGCGCUC	AGGGCGCG
5 185	GGCCGCCA	CUGAUGA	X	GAA	AGUCCGUC	GACGGACUC	UGGCGGCC
198	CGGCCAAC	CUGAUGA	X	GAA	ACCCGGCC	GGCCGGGUC	GUUGGCCG
201	CCCCGGCC	CUGAUGA	X	GAA	ACGACCCG	CGGGUCGUU	GGCCGGGG
240	GUGAGCGC	CUGAUGA	X	GAA	ACGCGGCC	GGCCGCGUC	GCGCUCAC
246	ACCAUGGU	CUGAUGA	X	GAA	AGCGCGAC	GUCGCGCUC	ACCAUGGU
10 255	CAGUAGCU	CUGAUGA	X	GAA	ACCAUGGU	ACCAUGGUC	AGCUACUG
260	UGUCCCAG	CUGAUGA	X	GAA	AGCUGACC	GGUCAGCUA	CUGGGACA
276	CACAGCAG	CUGAUGA	X	GAA	ACCCCGGU	ACCGGGGUC	CUGCUGUG
294	AGACAGCU	CUGAUGA	X	GAA	AGCAGCGC	GCGCUGCUC	AGCUGUCU
301	GAGAAGCA	CUGAUGA	X	GAA	ACAGCUGA	UCAGCUGUC	UGCUUCUC
15 306	CCUGUGAG	CUGAUGA	X	GAA	AGCAGACA	UGUCUGCUU	CUCACAGG
307	UCCUGUGA	CUGAUGA	X	GAA	AAGCAGAC	GUCUGCUUC	UCACAGGA
309	GAUCCUGU	CUGAUGA	X	GAA	AGAAGCAG	CUGCUUCUC	ACAGGAUC
317	CUGAACUA	CUGAUGA	X	GAA	AUCCUGUG	CACAGGAUC	UAGUUCAG
319	ACCUGAAC	CUGAUGA	X	GAA	AGAUCCUG	CAGGAUCUA	GUUCAGGU
20 322	UGAACCUG	CUGAUGA	X	GAA	ACUAGAUC	GAUCUAGUU	CAGGUUCA
323	UUGAACCU	CUGAUGA	X	GAA	AACUAGAU	AUCUAGUUC	AGGUUCAA
328	UAAUUUUG	CUGAUGA	X	GAA	ACCUGAAC	GUUCAGGUU	CAAAAUUA
329	UUAAUUUU	CUGAUGA	X	GAA	AACCUGAA	UUCAGGUUC	AAAAUUAA
335	GAUCUUUU	CUGAUGA	X	GAA	AUUUUGAA	UUCAAAAUU	AAAAGAUC
25 336	GGAUCUUU	CUGAUGA	X	GAA	AAUUUUGA	UCAAAAUUA	AAAGAUC
343	CAGUUCAG	CUGAUGA	X	GAA	AUCUUUUA	UAAAAGAUC	CUGAACUG
355	GCCUUUUA	CUGAUGA	X	GAA	ACUCAGUU	AACUGAGUU	UAAAAGGC
356	UGCCUUUU	CUGAUGA	X	GAA	AACUCAGU	ACUGAGUUU	AAAAGGCA
357	GUGCCUUU	CUGAUGA	X	GAA	AAACUCAG	CUGAGUUUA	AAAGGCAC
30 375	GCUUGCAU	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAUC	AUGCAAGC
400	GCAUUGGA	CUGAUGA	X	GAA	AUGCAGUG	CACUGCAUC	UCCAAUGC
402	CUGCAUUG	CUGAUGA	X	GAA	AGAUGCAG	CUGCAUCUC	CAAUGCAG
427	AGACCAUU	CUGAUGA	X	GAA	AUGGGCUG	CAGCCCAUA	AAUGGUCU

434	CAGGCAA	CUGAUGA	X	GAA	ACCAUUUA	UAAAUGGUC	UUUGCCUG
436	UUCAGGCA	CUGAUGA	X	GAA	AGACCAU	AAUGGUCUU	UGCCUGAA
437	UUUCAGGC	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUU	GCCUGAAA
454	GCUUUCU	CUGAUGA	X	GAA	ACUCACCA	UGGUGAGUA	AGGAAAGC
5	477	GAUUUAGU	CUGAUGA	X	GAA	AUGCUCAG	CUGAGCAUA
	481	GGCAGAUU	CUGAUGA	X	GAA	AGUUAUGC	ACUAAAUC
	485	CACAGGCA	CUGAUGA	X	GAA	AUUUAGUU	AAUCUGCC
	512	UACUGCAG	CUGAUGA	X	GAA	AUUGUUUG	AACUAAAUC
	513	GUACUGCA	CUGAUGA	X	GAA	AAUUGUUU	UGCCUGUG
10	520	GGUAAAAG	CUGAUGA	X	GAA	ACUGCAGA	CAAACAAU
	523	CAAGGUUA	CUGAUGA	X	GAA	AGUACUGC	CUGCAGUA
	524	UCAAGGUU	CUGAUGA	X	GAA	AAGUACUG	AAACAAUUC
	525	UUCAAGGU	CUGAUGA	X	GAA	AAAGUACU	UGCAGUAC
	530	CUGUGUUC	CUGAUGA	X	GAA	AGGUUAAA	UCUGCAGUA
15	541	GUUUGCUU	CUGAUGA	X	GAA	AGCUGUGU	CUUUAACC
	560	AGCUGUAG	CUGAUGA	X	GAA	AGCCAGUG	GCAGUACUU
	561	CAGCUGUA	CUGAUGA	X	GAA	AAGCCAGU	CAGUACUUU
	563	UGCAGCUG	CUGAUGA	X	GAA	AGAAGCCA	AACCUUGA
	575	CAGCUAGA	CUGAUGA	X	GAA	AUUUGCAG	AGUACUUUA
20	577	UACAGCUA	CUGAUGA	X	GAA	AUAUUUGC	ACCUUGAA
	579	GGUACAGC	CUGAUGA	X	GAA	AGAUUUU	UUUAACCUU
	585	GAAGUAGG	CUGAUGA	X	GAA	ACAGCUAG	GAACACAG
	589	CUUUGAAG	CUGAUGA	X	GAA	AGGUACAG	ACACAGCUC
	592	CUUCUUUG	CUGAUGA	X	GAA	AGUAGGUA	AAGCAAAC
25	593	UCUUCUUU	CUGAUGA	X	GAA	AAGUAGGU	CACUGGCUU
	614	AGAUUGCA	CUGAUGA	X	GAA	AUUCUGUU	CUACAGCU
	621	AAUAUAUA	CUGAUGA	X	GAA	AUUGCAGA	ACUGGCUUC
	623	UAAUAUA	CUGAUGA	X	GAA	AGAUUGCA	UACAGCUG
	625	AAUAAAUA	CUGAUGA	X	GAA	AUAGAUUG	UGGCUUCUA
30	627	CUAAUAAA	CUGAUGA	X	GAA	AUAUAGAU	CAGCUGCA
	629	CACUAAUA	CUGAUGA	X	GAA	AUAUAUAG	CUGCAAUA
	630	UCACUAAU	CUGAUGA	X	GAA	AAUAUAUA	UCUAGCUG
	631	AUCACUAA	CUGAUGA	X	GAA	AAUAUAU	CUGUACCUA

	633	GUAUCACU	CUGAUGA	X	GAA	AUAAAUAU	AUAUUUAUU	AGUGAUAC
	634	UGUAUCAC	CUGAUGA	X	GAA	AAUAAUA	UAUUUAUUA	GUGAUACA
	640	UCUACCUG	CUGAUGA	X	GAA	AUCACUAA	UUAGUGAUA	CAGGUAGA
	646	GAAAGGUC	CUGAUGA	X	GAA	ACCUGUAU	AUACAGGUA	GACCUUUC
5	652	CUCUACGA	CUGAUGA	X	GAA	AGGUCUAC	GUAGACCUU	UCGUAGAG
	653	UCUCUACG	CUGAUGA	X	GAA	AAGGUCUA	UAGACCUUU	CGUAGAGA
	654	AUCUCUAC	CUGAUGA	X	GAA	AAAGGUCU	AGACCUUUC	GUAGAGAU
	657	UACAUCUC	CUGAUGA	X	GAA	ACGAAAGG	CCUUUCGUA	GAGAUGUA
	665	UUUCACUG	CUGAUGA	X	GAA	ACAUCUCU	AGAGAUGUA	CAGUGAAA
10	675	AUUUCGGG	CUGAUGA	X	GAA	AUUUCACU	AGUGAAAUC	CCCGAAAU
	684	AUGUGUAU	CUGAUGA	X	GAA	AUUUCGGG	CCCGAAAUU	AUACACAU
	685	CAUGUGUA	CUGAUGA	X	GAA	AAUUUCGG	CCGAAAUUA	UACACAUG
	687	GUCAUGUG	CUGAUGA	X	GAA	AUAAUUUC	GAAAUUAUA	CACAUGAC
	711	GGAAUGAC	CUGAUGA	X	GAA	AGCUCCCU	AGGGAGCUC	GUCAUUC
15	714	CAGGGAAU	CUGAUGA	X	GAA	ACGAGCUC	GAGCUCGUC	AUUCUCCG
	717	CGGCAGGG	CUGAUGA	X	GAA	AUGACGAG	CUCGUCAUU	CCCUGCCG
	718	CCGGCAGG	CUGAUGA	X	GAA	AAUGACGA	UCGUCAUUC	CCUGCCGG
	729	GGUGACGU	CUGAUGA	X	GAA	ACCCGGCA	UGCCGGGUU	ACGUCACC
	730	AGGUGACG	CUGAUGA	X	GAA	AACCCGGC	GCCGGGUUA	CGUCACCU
20	734	UGUUAGGU	CUGAUGA	X	GAA	ACGUAACC	GGUUACGUC	ACCUAACA
	739	AGUGAUGU	CUGAUGA	X	GAA	AGGUGACG	CGUCACCUA	ACAUCACU
	744	GUAACAGU	CUGAUGA	X	GAA	AUGUUAGG	CCUAACAUC	ACUGUUAC
	750	UUUAAAGU	CUGAUGA	X	GAA	ACAGUGAU	AUCACUGUU	ACUUUAAA
	751	UUUUAAAG	CUGAUGA	X	GAA	AACAGUGA	UCACUGUUA	CUUUAAAA
25	754	CUUUUUUA	CUGAUGA	X	GAA	AGUAACAG	CUGUUACUU	UAAAAAAG
	755	ACUUUUUU	CUGAUGA	X	GAA	AAGUAACA	UGUUACUUU	AAAAAAGU
	756	AACUUUUU	CUGAUGA	X	GAA	AAAGUAAC	GUUACUUUA	AAAAAGUU
	764	CAAGUGGA	CUGAUGA	X	GAA	ACUUUUUU	AAAAAAGUU	UCCACUUG
	765	UCAAGUGG	CUGAUGA	X	GAA	AACUUUUU	AAAAAGUUU	CCACUUGA
30	766	GUCAAGUG	CUGAUGA	X	GAA	AAACUUUU	AAAAGUUUC	CACUUGAC
	771	AAAGUGUC	CUGAUGA	X	GAA	AGUGGAAA	UUUCCACUU	GACACUUU
	778	AGGGAUCA	CUGAUGA	X	GAA	AGUGUCAA	UUGACACUU	UGAUCCCU
	779	CAGGGAUC	CUGAUGA	X	GAA	AAGUGUCA	UGACACUUU	GAUCCCU

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783	CCAUCAGG	CUGAUGA	X	GAA	AUCAAAGU	ACUUUGAUC	CCUGAUGG
801	UCCCAGAU	CUGAUGA	X	GAA	AUGCGUUU	AAACGCAUA	AUCUGGGA
804	CUGUCCCA	CUGAUGA	X	GAA	AUUAUGCG	CGCAUAAUC	UGGGACAG
814	GCCCUUUC	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUA	GAAAGGGC
5 824	AUAUGAUG	CUGAUGA	X	GAA	AGCCCUUU	AAAGGGCUU	CAUCAUAU
825	GAUAUGAU	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUC	AUCAUAUC
828	UUUGAUAU	CUGAUGA	X	GAA	AUGAAGCC	GGCUUCAUC	AUAUCAA
831	GCAUUUGA	CUGAUGA	X	GAA	AUGAUGAA	UUCAUCAUA	UCAA AUGC
833	UUGCAUUU	CUGAUGA	X	GAA	AUAUGAUG	CAUCAUAUC	AAAUGCAA
10 845	UUUCUUUG	CUGAUGA	X	GAA	ACGUUGCA	UGCAACGUA	CAAAGAAA
855	AGAAGCCC	CUGAUGA	X	GAA	AUUUCUUU	AAAGAAUA	GGGCUUCU
861	CAGGUCAG	CUGAUGA	X	GAA	AGCCCUAU	AUAGGGCUU	CUGACCUG
862	ACAGGUCA	CUGAUGA	X	GAA	AAGCCCUA	UAGGGCUUC	UGACCUGU
882	UGCCCAUU	CUGAUGA	X	GAA	ACUGUUGC	GCAACAGUC	AAUGGGCA
15 892	CUUAUACA	CUGAUGA	X	GAA	AUGCCCAU	AUGGGCAUU	UGUAUAAG
893	UCUUAUAC	CUGAUGA	X	GAA	AAUGCCCA	UGGGCAUUU	GUUAUAAGA
896	UUGUCUUA	CUGAUGA	X	GAA	ACAA AUGC	GCAUUUGUA	UAAGACAA
898	GUUUGUCU	CUGAUGA	X	GAA	AUACAAAU	AUUUGUAUA	AGACAAAC
908	GUGUGAGA	CUGAUGA	X	GAA	AGUUUGUC	GACAAACUA	UCUCACAC
20 910	AUGUGUGA	CUGAUGA	X	GAA	AUAGUUUG	CAAACUAUC	UCACACAU
912	CGAUGUGU	CUGAUGA	X	GAA	AGAUAGUU	AACUAUCUC	ACACAUCG
919	GGUUUGUC	CUGAUGA	X	GAA	AUGUGUGA	UCACACAUC	GACAAACC
931	UAUGAUUG	CUGAUGA	X	GAA	AUUGGUUU	AAACCAUA	CAAUCAUA
936	ACAUCUAU	CUGAUGA	X	GAA	AUUGUAUU	AAUACAAUC	AUAGAUGU
25 939	UGGACAUC	CUGAUGA	X	GAA	AUGAUUGU	ACAAUCAUA	GAUGUCCA
945	CUUAUUUG	CUGAUGA	X	GAA	ACAUCUAU	AUAGAUGUC	CAAUAAG
951	GGUGUGCU	CUGAUGA	X	GAA	AUUUGGAC	GUCCAAUA	AGCACACC
969	AGUAAUUU	CUGAUGA	X	GAA	ACUGGGCG	CGCCCAGUC	AAAUUACU
974	CUCUAAGU	CUGAUGA	X	GAA	AUUUGACU	AGUCAAAUU	ACUUAGAG
30 975	CCUCUAAG	CUGAUGA	X	GAA	AAUUUGAC	GUCAAAUUA	CUUAGAGG
978	UGGCCUCU	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU	AGAGGCCA
979	AUGGCCUC	CUGAUGA	X	GAA	AAGUAAUU	AAUUAUUUA	GAGGCCAU
988	GACAAGAG	CUGAUGA	X	GAA	AUGGCCUC	GAGGCCAUA	CUCUUGUC



	991	GAGGACAA	CUGAUGA	X	GAA	AGUAUGGC	GCCAUACUC	UUGUCCUC
	993	UUGAGGAC	CUGAUGA	X	GAA	AGAGUAUG	CAUACUCUU	GUCCUCAA
	996	CAAUUGAG	CUGAUGA	X	GAA	ACAAGAGU	ACUCUUGUC	CUCAAUUG
	999	GUACAAUU	CUGAUGA	X	GAA	AGGACAAG	CUUGUCCUC	AAUUGUAC
5	1003	AGCAGUAC	CUGAUGA	X	GAA	AUUGAGGA	UCCUCAAUU	GUACUGCU
	1006	GGUAGCAG	CUGAUGA	X	GAA	ACAAUUGA	UCAAUUGUA	CUGCUACC
	1012	GGGAGUGG	CUGAUGA	X	GAA	AGCAGUAC	GUACUGCUA	CCACUCCC
	1018	GUUCAAGG	CUGAUGA	X	GAA	AGUGGUAG	CUACCACUC	CCUUGAAC
	1022	UCGUGUUC	CUGAUGA	X	GAA	AGGGAGUG	CACUCCCUU	GAACACGA
10	1035	GUCAUUUG	CUGAUGA	X	GAA	ACUCUCGU	ACGAGAGUU	CAAUGAC
	1036	GGUCAUUU	CUGAUGA	X	GAA	AACUCUCG	CGAGAGUUC	AAAUGACC
	1051	AUCAGGGU	CUGAUGA	X	GAA	ACUCCAGG	CCUGGAGUU	ACCCUGAU
	1052	CAUCAGGG	CUGAUGA	X	GAA	AACUCCAG	CUGGAGUUA	CCCUGAUG
	1069	AGCUCUCU	CUGAUGA	X	GAA	AUUUUUUU	AAAAAAUA	AGAGAGCU
15	1078	CCUUACGG	CUGAUGA	X	GAA	AGCUCUCU	AGAGAGCUU	CCGUAAGG
	1079	GCCUUACG	CUGAUGA	X	GAA	AAGCUCUC	GAGAGCUUC	CGUAAGGC
	1083	CGUCGCCU	CUGAUGA	X	GAA	ACGGAAGC	GCUUCCGUA	AGGCGACG
	1095	CUUUGGUC	CUGAUGA	X	GAA	AUUCGUCC	CGACGAAUU	GACCAAAG
	1108	GGCAUGGG	CUGAUGA	X	GAA	AUUGCUUU	AAAGCAAUU	CCCAUGCC
20	1109	UGGCAUGG	CUGAUGA	X	GAA	AAUUGCUU	AAGCAAUUC	CCAUGCCA
	1122	CUGUAGAA	CUGAUGA	X	GAA	AUGUUGGC	GCCAACAUU	UUCUACAG
	1124	CACUGUAG	CUGAUGA	X	GAA	AUAUGUUG	CAACAUUUU	CUACAGUG
	1125	ACACUGUA	CUGAUGA	X	GAA	AAUAUGUU	AACAUUUUC	UACAGUGU
	1127	GAACACUG	CUGAUGA	X	GAA	AGAAUAUG	CAUAUUCUA	CAGUGUUC
25	1134	AUAGUAAG	CUGAUGA	X	GAA	ACACUGUA	UACAGUGUU	CUUACUUA
	1135	AAUAGUAA	CUGAUGA	X	GAA	AACACUGU	ACAGUGUUC	UUACUAUU
	1137	UCAAUAGU	CUGAUGA	X	GAA	AGAACACU	AGUGUUCUU	ACUAUUGA
	1138	GUCAAUAG	CUGAUGA	X	GAA	AAGAACAC	GUGUUCUUA	CUAUUGAC
	1141	UUUGUCAA	CUGAUGA	X	GAA	AGUAAGAA	UUCUUACUA	UUGACAAA
30	1143	AUUUUGUC	CUGAUGA	X	GAA	AUAGUAAG	CUUACUAUU	GACAAAAU
	1173	CAAGUAUA	CUGAUGA	X	GAA	AGUCCUUU	AAAGGACUU	UAUACUUG
	1174	ACAAGUAU	CUGAUGA	X	GAA	AAGUCCUU	AAGGACUUU	AUACUUGU
	1175	GACAAGUA	CUGAUGA	X	GAA	AAAGUCCU	AGGACUUUA	UACUUGUC

1177	ACGACAAG	CUGAUGA	X	GAA	AUAAAGUC	GACUUUAUA	CUUGUCGU	
1180	UACACGAC	CUGAUGA	X	GAA	AGUAUAAA	UUUAUACUU	GUCGUGUA	
1183	CCUUAACAC	CUGAUGA	X	GAA	ACAAGUAU	AUACUUGUC	GUGUAAGG	
1188	CCACUCCU	CUGAUGA	X	GAA	ACACGACA	UGUCGUGUA	AGGAGUGG	
5	1202	AUUUGAAU	CUGAUGA	X	GAA	AUGGUCCA	UGGACCAUC	AUUCAAAU
	1205	CAGAUUUG	CUGAUGA	X	GAA	AUGAUGGU	ACCAUCAUU	CAAAUCUG
	1206	ACAGAUUU	CUGAUGA	X	GAA	AAUGAUGG	CCAUCAUUC	AAAUCUGU
	1211	UGUUAACA	CUGAUGA	X	GAA	AUUUGAAU	AUUCAAAUC	UGUUAACA
	1215	GAGGUGUU	CUGAUGA	X	GAA	ACAGAUUU	AAAUCUGUU	AACACCUC
10	1216	UGAGGUGU	CUGAUGA	X	GAA	AACAGAUU	AAUCUGUUA	ACACCUCA
	1223	UAUGCACU	CUGAUGA	X	GAA	AGGUGUUA	UAACACCUC	AGUGCAUA
	1231	AUCAUAUA	CUGAUGA	X	GAA	AUGCACUG	CAGUGCAUA	UAUAUGAU
	1233	UUAUCAUA	CUGAUGA	X	GAA	AUAUGCAC	GUGCAUAUA	UAUGAUAA
	1235	CUUUAUCA	CUGAUGA	X	GAA	AUAUAUGC	GCAUAUAUA	UGAUAAAG
15	1240	GAAUGCUU	CUGAUGA	X	GAA	AUCAUAUA	UAUAUGAUA	AAGCAUUC
	1247	CAGUGAUG	CUGAUGA	X	GAA	AUGCUUUA	UAAAGCAUU	CAUCACUG
	1248	ACAGUGAU	CUGAUGA	X	GAA	AAUGCUUU	AAAGCAUUC	AUCACUGU
	1251	UUCACAGU	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCauc	ACUGUGAA
	1264	CUGUUUUC	CUGAUGA	X	GAA	AUGUUUCA	UGAAACAUC	GAAAACAG
20	1281	ACGGUUUC	CUGAUGA	X	GAA	AGCACCUG	CAGGUGCUU	GAAACCGU
	1290	UUGCCAGC	CUGAUGA	X	GAA	ACGGUUUC	GAAACCGUA	GCUGGCAA
	1304	GCCGGUAA	CUGAUGA	X	GAA	ACCGCUUG	CAAGCGGUC	UUACCGGC
	1306	GAGCCGGU	CUGAUGA	X	GAA	AGACCGCU	AGCGGUCUU	ACCGGCUC
	1307	AGAGCCGG	CUGAUGA	X	GAA	AAGACCGC	GCGGUCUUA	CCGGCUCU
25	1314	UUCAUAGA	CUGAUGA	X	GAA	AGCCGGUA	UACCGGCUC	UCUAUGAA
	1316	CUUUCAUA	CUGAUGA	X	GAA	AGAGCCGG	CCGGCUCUC	UAUGAAAG
	1318	CACUUUCA	CUGAUGA	X	GAA	AGAGAGCC	GGCUCUCUA	UGAAAGUG
	1334	GCGAGGGA	CUGAUGA	X	GAA	AUGCCUUC	GAAGGCAUU	UCCCUCGC
	1335	GGCGAGGG	CUGAUGA	X	GAA	AAUGCCUU	AAGGCAUUU	CCCUCGCC
30	1336	CGGCGAGG	CUGAUGA	X	GAA	AAAUGCCU	AGGCAUUUC	CCUCGCCG
	1340	CUUCCGGC	CUGAUGA	X	GAA	AGGGAAAU	AUUUCCCUC	GCCGGAAG
	1350	AACCAUAC	CUGAUGA	X	GAA	ACUCCGG	CCGGAAGUU	GUAUGGUU
	1353	UUUAACCA	CUGAUGA	X	GAA	ACAACUUC	GAAGUUGUA	UGGUUAAA

	1358	CAUCUUUU	CUGAUGA	X	GAA	ACCAUACA	UGUAUGGUU	AAAAGAUG
	1359	CCAUCUUU	CUGAUGA	X	GAA	AACCAUAC	GUAUGGUUA	AAAGAUGG
	1370	UCGCAGGU	CUGAUGA	X	GAA	ACCCAUCU	AGAUGGGUU	ACCUGCGA
	1371	GUCGCAGG	CUGAUGA	X	GAA	AACCCAUC	GAUGGGUUA	CCUGCGAC
5	1388	AGCGAGCA	CUGAUGA	X	GAA	AUUUCUCA	UGAGAAAUC	UGCUCGCU
	1393	CAAAUAGC	CUGAUGA	X	GAA	AGCAGAUU	AAUCUGCUC	GCUAUUUG
	1397	GAGUCAA	CUGAUGA	X	GAA	AGCGAGCA	UGCUCGCUA	UUUGACUC
	1399	ACGAGUCA	CUGAUGA	X	GAA	AUAGCGAG	CUCGCUAUU	UGACUCGU
	1400	CACGAGUC	CUGAUGA	X	GAA	AAUAGCGA	UCGCUAUUU	GACUCGUG
10	1405	GUAGCCAC	CUGAUGA	X	GAA	AGUCAAAU	AUUUGACUC	GUGGCUAC
	1412	UUAACGAG	CUGAUGA	X	GAA	AGCCACGA	UCGUGGCUA	CUCGUUAA
	1415	UAAUUAAC	CUGAUGA	X	GAA	AGUAGCCA	UGGCUACUC	GUUAAUUA
	1418	UGAUAAU	CUGAUGA	X	GAA	ACGAGUAG	CUACUCGUU	AAUUAUCA
	1419	UUGAUAAU	CUGAUGA	X	GAA	AACGAGUA	UACUCGUUA	AUUAUCAA
15	1422	UCCUUGAU	CUGAUGA	X	GAA	AUUAACGA	UCGUUAAUU	AUCAAGGA
	1423	GUCCUUGA	CUGAUGA	X	GAA	AAUUAACG	CGUUAUUUA	UCAAGGAC
	1425	ACGUCCUU	CUGAUGA	X	GAA	AUAAUUAA	UUAAUUUUC	AAGGACGU
	1434	UCUUCAGU	CUGAUGA	X	GAA	ACGUCCUU	AAGGACGUA	ACUGAAGA
	1456	GAUUGUAU	CUGAUGA	X	GAA	AUUCCCUG	CAGGGAAUU	AUACAAUC
20	1457	AGAUUGUA	CUGAUGA	X	GAA	AAUUCCCU	AGGGAAUUA	UACAAUCU
	1459	CAAGAUUG	CUGAUGA	X	GAA	AUAAUUCC	GGAAUUUAU	CAAUCUUG
	1464	CUCAGCAA	CUGAUGA	X	GAA	AUUGUAUA	UAUACAAUC	UUGCUGAG
	1466	UGCUCAGC	CUGAUGA	X	GAA	AGAUUGUA	UACAAUCUU	GCUGAGCA
	1476	GACUGUUU	CUGAUGA	X	GAA	AUGCUCAG	CUGAGCAUA	AAACAGUC
25	1484	ACACAUUU	CUGAUGA	X	GAA	ACUGUUUU	AAAACAGUC	AAAUGUGU
	1493	GGUUUUUA	CUGAUGA	X	GAA	ACACAUUU	AAAUGUGUU	UAAAAACC
	1494	AGGUUUUU	CUGAUGA	X	GAA	AACACAUU	AAUGUGUUU	AAAAACCU
	1495	GAGGUUUU	CUGAUGA	X	GAA	AAACACAU	AUGUGUUUA	AAAACCUC
	1503	GUGGCAGU	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUC	ACUGCCAC
30	1513	GACAAUUA	CUGAUGA	X	GAA	AGUGGCAG	CUGCCACUC	UAAUUGUC
	1515	UUGACAAU	CUGAUGA	X	GAA	AGAGUGGC	GCCACUCUA	AUUGUCAA
	1518	ACAUUGAC	CUGAUGA	X	GAA	AUUAGAGU	ACUCUAAUU	GUCAAUGU
	1521	UUCACAUU	CUGAUGA	X	GAA	ACAAUUAG	CUAAUUGUC	AAUGUGAA

	1539	UUUUCGUA	CUGAUGA	X	GAA	AUCUGGGG	CCCCAGAUU	UACGAAAA
	1540	CUUUUCGU	CUGAUGA	X	GAA	AAUCUGGG	CCCAGAUUU	ACGAAAAG
	1541	CCUUUUCG	CUGAUGA	X	GAA	AAAUCUGG	CCAGAUUUA	CGAAAAGG
	1556	GAAACGAU	CUGAUGA	X	GAA	ACACGGCC	GGCCGUGUC	AUCGUUUC
5	1559	CUGGAAAC	CUGAUGA	X	GAA	AUGACACG	CGUGUCAUC	GUUUCCAG
	1562	GGUCUGGA	CUGAUGA	X	GAA	ACGAUGAC	GUCAUCGUU	UCCAGACC
	1563	GGGUCUGG	CUGAUGA	X	GAA	AACGAUGA	UCAUCGUUU	CCAGACCC
	1564	CGGGUCUG	CUGAUGA	X	GAA	AAACGAUG	CAUCGUUUC	CAGACCCG
	1576	UGGGUAGA	CUGAUGA	X	GAA	AGCCGGGU	ACCCGGCUC	UCUACCCA
10	1578	AGUGGGUA	CUGAUGA	X	GAA	AGAGCCGG	CCGGCUCUC	UACCCACU
	1580	CCAGUGGG	CUGAUGA	X	GAA	AGAGAGCC	GGCUCUCUA	CCCACUGG
	1602	CAAGUCAG	CUGAUGA	X	GAA	AUUUGUCU	AGACAAAUC	CUGACUUG
	1609	UGC GGUAC	CUGAUGA	X	GAA	AGUCAGGA	UCCUGACUU	GUACCGCA
	1612	AUAUGCGG	CUGAUGA	X	GAA	ACAAGUCA	UGACUUGUA	CCGCAUUA
15	1619	GGAUACCA	CUGAUGA	X	GAA	AUGCGGUA	UACCGCAUA	UGGUAUCC
	1624	UUGAGGGA	CUGAUGA	X	GAA	ACCAUAUG	CAUAUGGUA	UCCCUCAA
	1626	GGUUGAGG	CUGAUGA	X	GAA	AUACCAUA	UAUGGUAUC	CCUCAACC
	1630	UGUAGGUU	CUGAUGA	X	GAA	AGGGAUAC	GUAUCCCUC	AACCUACA
	1636	CUUGAUUG	CUGAUGA	X	GAA	AGGUUGAG	CUCAACCUA	CAAUCAAG
20	1641	AACCACUU	CUGAUGA	X	GAA	AUUGUAGG	CCUACAAUC	AAGUGGUU
	1649	GGUGCCAG	CUGAUGA	X	GAA	ACCACUUG	CAAGUGGUU	CUGGCACC
	1650	GGGUGCCA	CUGAUGA	X	GAA	AACCACUU	AAGUGGUUC	UGGCACCC
	1663	AUUAUGGU	CUGAUGA	X	GAA	ACAGGGGU	ACCCUGUA	ACCAUAAU
	1669	GGAAUGAU	CUGAUGA	X	GAA	AUGGUUAC	GUAACCAUA	AUCAUCC
25	1672	UUCGGAAU	CUGAUGA	X	GAA	AUUAUGGU	ACCAUAAUC	AUUCCGAA
	1675	UGC UUCG	CUGAUGA	X	GAA	AUGAUUAU	AUAAUCAUU	CCGAAGCA
	1676	UUGC UUCG	CUGAUGA	X	GAA	AAUGAUUA	UAAUCAUUC	CGAAGCAA
	1694	UGGAACAA	CUGAUGA	X	GAA	AGUCACAC	GUGUGACUU	UUGUCCAA
	1695	UUGGAACA	CUGAUGA	X	GAA	AAGUCACA	UGUGACUUU	UGUCCAA
30	1696	AUUGGAAC	CUGAUGA	X	GAA	AAAGUCAC	GUGACUUUU	GUUCCAAU
	1699	AUUAUUGG	CUGAUGA	X	GAA	ACAAAAGU	ACUUUUGUU	CCAUAAAU
	1700	CAUUAUUG	CUGAUGA	X	GAA	AACAAAAG	CUUUUGUUC	CAAUAAUG
	1705	CUCUUCAU	CUGAUGA	X	GAA	AUUGGAAC	GUUCCAAUA	AUGAAGAG

1715	GGAUAAAG	CUGAUGA	X	GAA	ACUCUUCA	UGAAGAGUC	CUUUAUCC
1718	CCAGGAUA	CUGAUGA	X	GAA	AGGACUCU	AGAGUCCUU	UAUCCUGG
1719	UCCAGGAU	CUGAUGA	X	GAA	AAGGACUC	GAGUCCUUU	AUCCUGGA
1720	AUCCAGGA	CUGAUGA	X	GAA	AAAGGACU	AGUCCUUUA	UCCUGGAU
5	1722	GCAUCCAG	X	GAA	AUAAAGGA	UCCUUUAUC	CUGGAUGC
	1755	AUGCUCUC	X	GAA	AUUCUGUU	AACAGAAUU	GAGAGCAU
	1764	CGCUGAGU	X	GAA	AUGCUCUC	GAGAGCAUC	ACUCAGCG
	1768	CAUGCVCU	X	GAA	AGUGAUGC	GCAUCACUC	AGCGCAUG
	1782	CCUUCUUA	X	GAA	AUUGCCAU	AUGGCAUA	AUAGAAGG
10	1785	UUUCCUUC	X	GAA	AUUAUUGC	GCAAUAAUA	GAAGGAAA
	1798	AGCCAUCU	X	GAA	AUUCUUUC	GAAAGAAUA	AGAUGGCU
	1807	CAAGGUGC	X	GAA	AGCCAUCU	AGAUGGCUA	GCACCUUG
	1814	CCACAACC	X	GAA	AGGUGCUA	UAGCACCUC	GGUUGUGG
	1818	UCAGCCAC	X	GAA	ACCAAGGU	ACCUUGGUU	GUGGCUGA
15	1829	AAAUUCUA	X	GAA	AGUCAGCC	GGCUGACUC	UAGAAUUU
	1831	AGAAAUUC	X	GAA	AGAGUCAG	CUGACUCUA	GAAUUUCU
	1836	AUUC CAGA	X	GAA	AUUCUAGA	UCUAGAAUU	UCUGGAAU
	1837	GAUUC CAG	X	GAA	AAUUCUAG	CUAGAAUUU	CUGGAAUC
	1838	AGAUUCCA	X	GAA	AAAUUCUA	UAGAAUUUC	UGGAAUCU
20	1845	CAAAUGUA	X	GAA	AUUC CAGA	UCUGGAAUC	UACAUUUG
	1847	UGCAA AUG	X	GAA	AGAUUCCA	UGGAAUCUA	CAUUUGCA
	1851	GCUAUGCA	X	GAA	AUGUAGAU	AUCUACAUU	UGCAUAGC
	1852	AGCUAUGC	X	GAA	AAUGUAGA	UCUACAUUU	GCAUAGCU
	1857	UUGGAAGC	X	GAA	AUGCAA AU	AUUUGCAUA	GCUUCCAA
25	1861	UUUAUUGG	X	GAA	AGCUAUGC	GCAUAGCUU	CCAAUAAA
	1862	CUUUAUUG	X	GAA	AAGCUAUG	CAUAGCUUC	CAAUAAAG
	1867	CCCAACUU	X	GAA	AUUGGAAG	CUUCCAAUA	AAGUUGGG
	1872	ACAGUCCC	X	GAA	ACUUUAUU	AAUAAAGUU	GGGACUGU
	1893	UAAAAGCU	X	GAA	AUGUUUCU	AGAAACAU	AGCUUUUA
30	1898	UGAUUAUA	X	GAA	AGCUUAUG	CAUAAGCUU	UUUAUUA
	1899	GUGAUUA	X	GAA	AAGCUUAU	AUAAGCUUU	UAUAUCAC
	1900	UGUGAUUA	X	GAA	AAAGCUUA	UAAGCUUUU	AUAUCACA
	1901	CUGUGAUA	X	GAA	AAAAGCUU	AAGCUUUUA	UAUCACAG

	1903	AUCUGUGA	CUGAUGA	X	GAA	AUAAAAGC	GCUUUUAUA	UCACAGAU
	1905	ACAUCUGU	CUGAUGA	X	GAA	AUAUAAAA	UUUUUAUUC	ACAGAUGU
	1925	UAACAUGA	CUGAUGA	X	GAA	ACCCAUUU	AAAUGGGUU	UCAUGUUA
	1926	UUAACAUG	CUGAUGA	X	GAA	AACCCAUU	AAUGGGUUU	CAUGUUA
5	1927	GUUAACAU	CUGAUGA	X	GAA	AAACCCAU	AUGGGUUUC	AUGUUAAC
	1932	UCCAAGUU	CUGAUGA	X	GAA	ACAUGAAA	UUUCAUGUU	AACUUGGA
	1933	UCCAAGU	CUGAUGA	X	GAA	AACAUGAA	UUCAUGUUA	ACUUGGAA
	1937	UUUUUCC	CUGAUGA	X	GAA	AGUUAACA	UGUUAACUU	GGAAAAAA
	1976	CUGUGCAA	CUGAUGA	X	GAA	ACAGUUUC	GAAACUGUC	UUGCACAG
10	1978	AACUGUGC	CUGAUGA	X	GAA	AGACAGUU	AACUGUCUU	GCACAGUU
	1986	AACUUGUU	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUU	AACAAGUU
	1987	GAACUUGU	CUGAUGA	X	GAA	AACUGUGC	GCACAGUUA	ACAAGUUC
	1994	UGUAUAAG	CUGAUGA	X	GAA	ACUUGUUA	UAACAAGUU	CUUAUACA
	1995	CUGUAUAA	CUGAUGA	X	GAA	AACUUGUU	AACAAGUUC	UUAUACAG
15	1997	CUCUGUAU	CUGAUGA	X	GAA	AGAACUUG	CAAGUUCUU	AUACAGAG
	1998	UCUCUGUA	CUGAUGA	X	GAA	AAGAACUU	AAGUUCUUA	UACAGAGA
	2000	CGUCUCUG	CUGAUGA	X	GAA	AUAAGAAC	GUUCUUAUA	CAGAGACG
	2010	AUCCAAGU	CUGAUGA	X	GAA	ACGUCUCU	AGAGACGUU	ACUUGGAU
	2011	AAUCCAAG	CUGAUGA	X	GAA	AACGUCUC	GAGACGUUA	CUUGGAUU
20	2014	UAAAAUCC	CUGAUGA	X	GAA	AGUAACGU	ACGUUACUU	GGAUUUUA
	2019	CGCAGUAA	CUGAUGA	X	GAA	AUCCAAGU	ACUUGGAUU	UUACUGCG
	2020	CCGCAGUA	CUGAUGA	X	GAA	AAUCCAAG	CUUGGAUUU	UACUGCGG
	2021	UCCGCAGU	CUGAUGA	X	GAA	AAAUCCAA	UUGGAUUUU	ACUGCGGA
	2022	GUCCGCAG	CUGAUGA	X	GAA	AAAAUCCA	UGGAUUUUA	CUGCGGAC
25	2034	CUGUUAUU	CUGAUGA	X	GAA	ACUGUCCG	CGGACAGUU	AAUAACAG
	2035	UCUGUUAU	CUGAUGA	X	GAA	AACUGUCC	GGACAGUUA	AUAACAGA
	2038	UGUUCUGU	CUGAUGA	X	GAA	AUUAACUG	CAGUUAUA	ACAGAACA
	2054	UAAUACUG	CUGAUGA	X	GAA	AGUGCAUU	AAUGCACUA	CAGUAUUA
	2059	CUUGC UAA	CUGAUGA	X	GAA	ACUGUAGU	ACUACAGUA	UUAGCAAG
30	2061	UGCUGUCU	CUGAUGA	X	GAA	AUACUGUA	UACAGUAUU	AGCAAGCA
	2062	UUGCUGUC	CUGAUGA	X	GAA	AAUACUGU	ACAGUAUUA	GCAAGCAA
	2082	UCCUAGU	CUGAUGA	X	GAA	AUGGCCAU	AUGGCCAUC	ACUAAGGA
	2086	GUGCUCU	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA	AGGAGCAC

	2096	GAGUGAUG	CUGAUGA	X	GAA	AGUGCUC	GGAGCACUC	CAUCACUC
	2100	UUAAGAGU	CUGAUGA	X	GAA	AUGGAGUG	CACUCCAUC	ACUCUUA
	2104	AAGAUUAA	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUC	UUAUUCU
	2106	GUAAGAUU	CUGAUGA	X	GAA	AGAGUGAU	AUCACUCU	AAUCUJAC
5	2107	GGUAAGAU	CUGAUGA	X	GAA	AAGAGUGA	UCACUCUUA	AUCUJACC
	2110	GAUGGUAA	CUGAUGA	X	GAA	AUUAAGAG	CUCUJAAUC	UJACCAUC
	2112	AUGAUGGU	CUGAUGA	X	GAA	AGAUJAA	CUJAAUCU	ACCAUCAU
	2113	CAUGAUGG	CUGAUGA	X	GAA	AAGAUJAA	UJAAUCUUA	CCAUCAUG
	2118	ACAUUCAU	CUGAUGA	X	GAA	AUGGUAA	CUJACCAUC	AUGAAUGU
10	2127	UGCAGGGA	CUGAUGA	X	GAA	ACAUUCAU	AUGAAUGU	UCCUGCA
	2128	UUGCAGGG	CUGAUGA	X	GAA	AACAUUCA	UGAAUGUU	CCCUGCAA
	2129	CUUGCAGG	CUGAUGA	X	GAA	AAACAUUC	GAAUGUUC	CCUGCAAG
	2140	GGUGCCUG	CUGAUGA	X	GAA	AUCUUGCA	UGCAAGAU	CAGGCACC
	2141	AGGUGCCU	CUGAUGA	X	GAA	AAUCUUGC	GCAAGAUUC	AGGCACCU
15	2150	UGCAGGCA	CUGAUGA	X	GAA	AGGUGCCU	AGGCACCUA	UGCCUGCA
	2172	CCUGUGUA	CUGAUGA	X	GAA	ACAUUCCU	AGGAUGUA	UACACAGG
	2174	CCCCUGUG	CUGAUGA	X	GAA	AUACAUUC	GAAUGUAUA	CACAGGGG
	2190	UUCUGGAG	CUGAUGA	X	GAA	AUUCUUC	GAAGAAUC	CUCCAGAA
	2193	UUCUUCUG	CUGAUGA	X	GAA	AGGAUUC	GAAAUCCUC	CAGAAGAA
20	2208	CUGAUUGU	CUGAUGA	X	GAA	AUUCUUCU	AAAGAAU	ACAAUCAG
	2209	UCUGAUUG	CUGAUGA	X	GAA	AAUUCU	AAGAAUUA	CAAUCAGA
	2214	UGAUCUCU	CUGAUGA	X	GAA	AUUGUAAU	AUJACAAUC	AGAGAUCA
	2221	UGCJUCCU	CUGAUGA	X	GAA	AUCUCUGA	UCAGAGAU	AGGAAGCA
	2234	GCAGGAGG	CUGAUGA	X	GAA	AUGGUGCU	AGCACCAUA	CCUCCUGC
25	2238	UJUCGCAG	CUGAUGA	X	GAA	AGGUJUGG	CCAUACCUC	CUGCGAAA
	2250	UGAUCACU	CUGAUGA	X	GAA	AGGUJUGG	CGAAACCUC	AGUGAUCA
	2257	CACUGUGU	CUGAUGA	X	GAA	AUCACUGA	UCAGUGAU	ACACAGUG
	2271	GAACUGCU	CUGAUGA	X	GAA	AUGGCCAC	GUGGCCAUC	AGCAGUUC
	2278	AGUGGUGG	CUGAUGA	X	GAA	ACUGCUGA	UCAGCAGU	CCACCACU
30	2279	AAGUGGUG	CUGAUGA	X	GAA	AACUGCUG	CAGCAGUUC	CACCACU
	2287	ACAGUCUA	CUGAUGA	X	GAA	AGUGGUGG	CCACCACU	UAGACUGU
	2288	GACAGUCU	CUGAUGA	X	GAA	AAGUGGUG	CACCACU	AGACUGUC
	2289	UGACAGUC	CUGAUGA	X	GAA	AAAGUGGU	ACCACUUA	GACUGUCA

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	2296	AUUAGCAU	CUGAUGA	X	GAA	ACAGUCUA	UAGACUGUC	AUGCUGAAU
	2302	GACACCAU	CUGAUGA	X	GAA	AGCAUGAC	GUCAUGCUA	AUGGUGUC
	2310	GGCUCGGG	CUGAUGA	X	GAA	ACACCAUU	AAUGGUGUC	CCCGAGCC
	2320	AGUGAUCU	CUGAUGA	X	GAA	AGGCUCGG	CCGAGCCUC	AGAUCACU
5	2325	AACCAAGU	CUGAUGA	X	GAA	AUCUGAGG	CCUCAGAUC	ACUUGGUU
	2329	UUUAAACC	CUGAUGA	X	GAA	AGUGAUCU	AGAUCACUU	GGUUUAAA
	2333	UGUUUUUA	CUGAUGA	X	GAA	ACCAAGUG	CACUUGGUU	UAAAAACA
	2334	UUGUUUUU	CUGAUGA	X	GAA	AACCAAGU	ACUUGGUUU	AAAAACAA
	2335	GUUGUUUU	CUGAUGA	X	GAA	AAACCAAG	CUUGGUUUA	AAAACAAC
10	2352	UCUUGUUG	CUGAUGA	X	GAA	AUUUUGUG	CACAAAUA	CAACAAGA
	2370	CCUAAAAU	CUGAUGA	X	GAA	AUUC CAGG	CCUGGAAUU	AUUUUAGG
	2371	UCCUAAAA	CUGAUGA	X	GAA	AAUUC CAG	CUGGAAUUA	UUUUAGGA
	2373	GGUCCUAA	CUGAUGA	X	GAA	AUAAUUC	GGAAUUAUU	UUAGGACC
	2374	UGGUCCUA	CUGAUGA	X	GAA	AAUAAUUC	GAAUUAUUU	UAGGACCA
15	2375	CUGGUCCU	CUGAUGA	X	GAA	AAAUAAU	AAUUAUUUU	AGGACCAG
	2376	CCUGGUCC	CUGAUGA	X	GAA	AAAUAUU	AUUUAUUUA	GGACCAGG
	2399	UUUCAUA	CUGAUGA	X	GAA	ACAGCGUG	CACGCUGUU	UAUUGAAA
	2400	CUUUCAAU	CUGAUGA	X	GAA	AACAGCGU	ACGCUGUUU	AUUGAAAG
	2401	UCUUUCAA	CUGAUGA	X	GAA	AAACAGCG	CGCUGUUUA	UUGAAAGA
20	2403	ACUCUUUC	CUGAUGA	X	GAA	AUAAACAG	CUGUUUAUU	GAAAGAGU
	2412	UCUUCUGU	CUGAUGA	X	GAA	ACUCUUUC	GAAAGAGUC	ACAGAAGA
	2433	CAGUGAUA	CUGAUGA	X	GAA	ACACCUUC	GAAGGUGUC	UAUCACUG
	2435	UGCAGUGA	CUGAUGA	X	GAA	AGACACCU	AGGUGUCUA	UCACUGCA
	2437	UUUGCAGU	CUGAUGA	X	GAA	AUAGACAC	GUGUCUAUC	ACUGCAAA
25	2465	UUUCCACA	CUGAUGA	X	GAA	AGCCCUUC	GAAGGGCUC	UGUGGAAA
	2476	GUAUGCUG	CUGAUGA	X	GAA	ACUUUCCA	UGGAAAGUU	CAGCAUAC
	2477	GGUAUGCU	CUGAUGA	X	GAA	AACUUUCC	GGAAAGUUC	AGCAUACC
	2483	CAGUGAGG	CUGAUGA	X	GAA	AUGCUGAA	UUCAGCAUA	CCUCACUG
	2487	UGAACAGU	CUGAUGA	X	GAA	AGGUAUGC	GCAUACCUC	ACUGUUCA
30	2493	GUUCCUUG	CUGAUGA	X	GAA	ACAGUGAG	CUCACUGUU	CAAGGAAC
	2494	GGUCCCUU	CUGAUGA	X	GAA	AACAGUGA	UCACUGUUC	AAGGAACC
	2504	ACUUGUCC	CUGAUGA	X	GAA	AGGUUCCU	AGGAACCUC	GGACAAGU
	2513	CCAGAUUA	CUGAUGA	X	GAA	ACUUGUCC	GGACAAGUC	UAAUCUGG



	2515	CUCCAGAU	CUGAUGA	X	GAA	AGACUUGU	ACAAGUCUA	AUCUGGAG
	2518	CAGCUCCA	CUGAUGA	X	GAA	AUUAGACU	AGUCUAAUC	UGGAGCUG
	2529	GUUAGAGU	CUGAUGA	X	GAA	AUCAGCUC	GAGCUGAUC	ACUCUAAC
	2533	GCAUGUUA	CUGAUGA	X	GAA	AGUGAUCA	UGAUCACUC	UAACAUGC
5	2535	GUGCAUGU	CUGAUGA	X	GAA	AGAGUGAU	AUCACUCUA	ACAUGCAC
	2560	CCAGAAGA	CUGAUGA	X	GAA	AGUCGCAG	CUGCGACUC	UCUUCUGG
	2562	AGCCAGAA	CUGAUGA	X	GAA	AGAGUCGC	GCGACUCUC	UUCUGGCU
	2564	GGAGCCAG	CUGAUGA	X	GAA	AGAGAGUC	GACUCUCUU	CUGGCUCC
	2565	AGGAGCCA	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUC	UGGCUCCU
10	2571	GUUAAUAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUC	CUAUUAAC
	2574	AGGGUUA	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUA	UUAACCCU
	2576	GGAGGGUU	CUGAUGA	X	GAA	AUAGGAGC	GCUCCUAUU	AACCCUCC
	2577	AGGAGGGU	CUGAUGA	X	GAA	AAUAGGAG	CUCCUAUUA	ACCCUCCU
	2583	CGGAUAAG	CUGAUGA	X	GAA	AGGGUUA	UUAACCCUC	CUUAUCCG
15	2586	UUUCGGAU	CUGAUGA	X	GAA	AGGAGGGU	ACCCUCCUU	AUCCGAAA
	2587	UUUUCGGA	CUGAUGA	X	GAA	AAGGAGGG	CCCUCCUUA	UCCGAAAA
	2589	AUUUUUCG	CUGAUGA	X	GAA	AUAAGGAG	CUCCUUAUC	CGAAAAAU
	2606	CAGAAGAA	CUGAUGA	X	GAA	ACCUUUUC	GAAAAGGUC	UUCUUCUG
	2608	UUCAGAAG	CUGAUGA	X	GAA	AGACCUUU	AAAGGUCUU	CUUCUGAA
20	2609	UUUCAGAA	CUGAUGA	X	GAA	AAGACCUU	AAGGUCUUC	UUCUGAAA
	2611	UAUUUCAG	CUGAUGA	X	GAA	AGAAGACC	GGUCUUCUU	CUGAAAUU
	2612	UUAUUUCA	CUGAUGA	X	GAA	AAGAAGAC	GUCUUCUUC	UGAAAUAA
	2619	UCAGUCUU	CUGAUGA	X	GAA	AUUUCAGA	UCUGAAAUU	AAGACUGA
	2630	UUGAUAGG	CUGAUGA	X	GAA	AGUCAGUC	GACUGACUA	CCUAUCAA
25	2634	AUAAUUGA	CUGAUGA	X	GAA	AGGUAGUC	GACUACCUA	UCAAUUUA
	2636	UUAUAAUU	CUGAUGA	X	GAA	AUAGGUAG	CUACCUAUC	AAUUAUAA
	2640	UCCAUAUU	CUGAUGA	X	GAA	AUUGAUAG	CUAUCAAUU	AUAAUGGA
	2641	GUCCAUAU	CUGAUGA	X	GAA	AAUUGAUA	UAUCAAUUA	UAAUGGAC
	2643	GGGUCCA	CUGAUGA	X	GAA	AUAAUUGA	UCAAUUAUA	AUGGACCC
30	2661	UCCAAAGG	CUGAUGA	X	GAA	ACUUCAUC	GAUGAAGUU	CCUUUGGA
	2662	AUCCAAAG	CUGAUGA	X	GAA	AACUUCAU	AUGAAGUUC	CUUUGGAU
	2665	CUCAUCCA	CUGAUGA	X	GAA	AGGAACUU	AAGUCCUUU	UGGAUGAG
	2666	GCUCAUCC	CUGAUGA	X	GAA	AAGGAACU	AGUCCUUUU	GGAUGAGC

2688	UCAUAAGG	CUGAUGA	X	GAA	AGCCGCUC	GAGCGGCUC	CCUUAUGA
2692	GGCAUCAU	CUGAUGA	X	GAA	AGGGAGCC	GGCUCCCUU	AUGAUGCC
2693	UGGCAUCA	CUGAUGA	X	GAA	AAGGGAGC	GCUCCCUUA	UGAUGCCA
2714	CCCGGGCA	CUGAUGA	X	GAA	ACUCCAC	GUGGGAGUU	UGCCCGGG
5 2715	UCCCGGGC	CUGAUGA	X	GAA	AACUCCCA	UGGGAGUUU	GCCCGGGA
2730	CCCAGUUU	CUGAUGA	X	GAA	AGUCUCUC	GAGAGACUU	AAACUGGG
2731	GCCCAGUU	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUA	AACUGGGC
2744	UUCCAAGU	CUGAUGA	X	GAA	AUUUGCCC	GGGCAAUUC	ACUUGGAA
2748	CCUCUUC	CUGAUGA	X	GAA	AGUGAUUU	AAAUACUU	GGAAGAGG
10 2761	UUUUCCAA	CUGAUGA	X	GAA	AGCCCCUC	GAGGGGCUU	UUGGAAAA
2762	CUUUUCCA	CUGAUGA	X	GAA	AAGCCCCU	AGGGGCUUU	UGGAAAAG
2763	ACUUUUCC	CUGAUGA	X	GAA	AAAGCCCC	GGGGCUUUU	GGAAAAGU
2775	GAUGCUG	CUGAUGA	X	GAA	ACCACUUU	AAAGUGGUU	CAAGCAUC
2776	UGAUGCUG	CUGAUGA	X	GAA	AACCACUU	AAGUGGUUC	AAGCAUCA
15 2783	CAAUGCU	CUGAUGA	X	GAA	AUGCUGA	UCAAGCAUC	AGCAUUUG
2789	UAAUGCCA	CUGAUGA	X	GAA	AUGCUGAU	AUCAGCAUU	UGGCAUUA
2790	UUAUGCC	CUGAUGA	X	GAA	AAUGCUGA	UCAGCAUUU	GGCAUUA
2796	GAUUUCU	CUGAUGA	X	GAA	AUGCCAAA	UUUGGCAUU	AAGAAAUC
2797	UGAUUUCU	CUGAUGA	X	GAA	AAUGCCAA	UUGGCAUUA	AGAAAUCA
20 2804	ACGUAGGU	CUGAUGA	X	GAA	AUUUCUUA	UAAGAAAUC	ACCUACGU
2809	CCGGCACG	CUGAUGA	X	GAA	AGGUGAUU	AAUCACCUA	CGUGCCGG
2864	GAGCUUUG	CUGAUGA	X	GAA	ACUCGCUG	CAGCGAGUA	CAAAGCUC
2872	AGUCAUCA	CUGAUGA	X	GAA	AGCUUUGU	ACAAAGCUC	UGAUGACU
2886	AAGAUUUU	CUGAUGA	X	GAA	AGCUCAGU	ACUGAGCUA	AAAAUCUU
25 2892	UGGGUCAA	CUGAUGA	X	GAA	AUUUUUAG	CUAAAAAUC	UUGACCCA
2894	UGUGGGUC	CUGAUGA	X	GAA	AGAUUUUU	AAAAAUCUU	GACCCACA
2904	UGGUGGCC	CUGAUGA	X	GAA	AUGUGGGU	ACCCACAUU	GGCCACCA
2914	CACGUUCA	CUGAUGA	X	GAA	AUGGUGGC	GCCACCAUC	UGAACGUG
2925	AGCAGGUU	CUGAUGA	X	GAA	ACCACGUU	AACGUGGUU	AACCUGCU
30 2926	CAGCAGGU	CUGAUGA	X	GAA	AACCACGU	ACGUGGUUA	ACCUGCUG
2962	CACCAUCA	CUGAUGA	X	GAA	AGGCCCUC	GAGGGCCUC	UGAUGGUG
2973	UAUUCAAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUUGAAUA
2976	CAGUAUUC	CUGAUGA	X	GAA	ACAAUCAC	GUGAUUGUU	GAAUACUG

2981	AUUUGCAG	CUGAUGA	X	GAA	AUUCAACA	UGUUGAAUA	CUGCAAUA
2990	GAUUUCCA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAUA	UGGAAAU
2998	GUUGGAGA	CUGAUGA	X	GAA	AUUUCCA	AUGGAAAU	UCUCCAAC
3000	UAGUUGGA	CUGAUGA	X	GAA	AGAUUCC	GGAAAU	UCUCCAAC
5	3002	GGUAGUUG	CUGAUGA	X	GAA	AGAGAUU	AAAUCUCUC
3008	UCUUGAGG	CUGAUGA	X	GAA	AGUUGGAG	CUCCAACUA	CCUCAAGA
3012	UUGCUCUU	CUGAUGA	X	GAA	AGGUAGUU	AACUACCUC	AAGAGCAA
3029	GAAAAAAU	CUGAUGA	X	GAA	AGUCACGU	ACGUGACUU	AUUUUUUC
3030	AGAAAAAA	CUGAUGA	X	GAA	AAGUCACG	CGUGACUUA	UUUUUUUC
10	3032	UGAGAAAA	CUGAUGA	X	GAA	AUAAGUCA	UGACUUAUU
3033	UUGAGAAA	CUGAUGA	X	GAA	AAUAAGUC	GACUUAUUU	UUUCUCA
3034	GUUGAGAA	CUGAUGA	X	GAA	AAAUAAGU	ACUUAUUUU	UUCUCAAC
3035	UGUUGAGA	CUGAUGA	X	GAA	AAAUAAG	CUUAUUUUU	UCUCAACA
3036	UUGUUGAG	CUGAUGA	X	GAA	AAAAUAA	UUUUUUUUU	CUCAACAA
15	3037	CUUGUUGA	CUGAUGA	X	GAA	AAAAAUAA	UAUUUUUUC
3039	UCCUUGUU	CUGAUGA	X	GAA	AGAAAAAA	UUUUUUUCUC	AACAAGGA
3057	UCCAUGUG	CUGAUGA	X	GAA	AGUGCUGC	GCAGCACUA	CACAUGGA
3070	UUCUUUCU	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	AGAAAGAA
3120	ACGCUAUC	CUGAUGA	X	GAA	AGUCUUGG	CCAAGACUA	GAUAGCGU
20	3124	GGUGACGC	CUGAUGA	X	GAA	AUCUAGUC	GACUAGAU
3129	CUGCUGGU	CUGAUGA	X	GAA	ACGCUAUC	GAUAGCGUC	ACCAGCAG
3146	AGCUCGCA	CUGAUGA	X	GAA	AGCUUUCG	CGAAAGCUU	UGCGAGCU
3147	GAGCUCGC	CUGAUGA	X	GAA	AAGCUUUC	GAAAGCUUU	GCGAGCUC
3155	GAAAGCCG	CUGAUGA	X	GAA	AGCUCGCA	UGCGAGCUC	CGGCUUUC
25	3161	CUUCCUGA	CUGAUGA	X	GAA	AGCCGGAG	CUCCGGCUU
3162	UCUCCUG	CUGAUGA	X	GAA	AAGCCGGA	UCCGGCUUU	CAGGAAGA
3163	AUCUCCU	CUGAUGA	X	GAA	AAAGCCGG	CCGGCUUUC	AGGAAGAU
3172	CAGACUUU	CUGAUGA	X	GAA	AUCUCCU	AGGAAGAU	AAAGUCUG
3178	AUCACUCA	CUGAUGA	X	GAA	ACUUUUU	AUAAAAGUC	UGAGUGAU
30	3189	UCUCCUC	CUGAUGA	X	GAA	ACAUCACU	AGUGAUGUU
3205	ACCGUCAG	CUGAUGA	X	GAA	AUCCUCCU	AGGAGGAUU	CUGACGGU
3206	AACCGUCA	CUGAUGA	X	GAA	AAUCCUCC	GGAGGAUUC	UGACGGUU
3214	CUUGUAGA	CUGAUGA	X	GAA	ACCGUCAG	CUGACGGUU	UCUACAAG

	3215	CCUUGUAG	CUGAUGA	X	GAA	AACCGUCA	UGACGGUUU	CUACAAGG
	3216	UCCUUGUA	CUGAUGA	X	GAA	AAACCGUC	GACGGUUUC	UACAAGGA
	3218	GCUCCUUG	CUGAUGA	X	GAA	AGAAACCG	CGGUUUCUA	CAAGGAGC
	3231	UCCAUAGU	CUGAUGA	X	GAA	AUGGGCUC	GAGCCCAUC	ACUAUGGA
5	3235	AUCUUCCA	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA	UGGAAGAU
	3244	AGAAAUCA	CUGAUGA	X	GAA	AUCUUCCA	UGGAAGAU	UGAUUUCU
	3249	CUGUAAGA	CUGAUGA	X	GAA	AUCAGAUC	GAUCUGAUU	UCUACAG
	3250	ACUGUAAG	CUGAUGA	X	GAA	AAUCAGAU	AUCUGAUUU	CUUACAGU
	3251	AACUGUAA	CUGAUGA	X	GAA	AAAUCAGA	UCUGAUUUC	UUACAGUU
10	3253	AAAACUGU	CUGAUGA	X	GAA	AGAAAUCA	UGAUUUCUU	ACAGUUUU
	3254	GAAAACUG	CUGAUGA	X	GAA	AAGAAAUC	GAUUUCUUA	CAGUUUUC
	3259	CACUUGAA	CUGAUGA	X	GAA	ACUGUAAG	CUUACAGUU	UUCAAGUG
	3260	CCACUUGA	CUGAUGA	X	GAA	AACUGUAA	UUACAGUUU	UCAAGUGG
	3261	GCCACUUG	CUGAUGA	X	GAA	AAACUGUA	UACAGUUUU	CAAGUGGC
15	3262	GGCCACUU	CUGAUGA	X	GAA	AAAACUGU	ACAGUUUUC	AAGUGGCC
	3284	AAGACAGG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CCUGUCUU
	3285	GAAGACAG	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUC	CUGUCUUC
	3290	UUCUGGAA	CUGAUGA	X	GAA	ACAGGAAC	GUUCCUGUC	UCCAGAA
	3292	CUUUCUGG	CUGAUGA	X	GAA	AGACAGGA	UCCUGUCUU	CCAGAAAG
20	3293	ACUUUCUG	CUGAUGA	X	GAA	AAGACAGG	CCUGUCUUC	CAGAAAGU
	3306	UCCCGAUG	CUGAUGA	X	GAA	AUGCACUU	AAGUGCAUU	CAUCGGGA
	3307	GUCCCGAU	CUGAUGA	X	GAA	AAUGCACU	AGUGCAUUC	AUCGGGAC
	3310	CAGGUCCC	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCAUC	GGGACCUG
	3333	GAUAAAAG	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUU	CUUUUAUC
25	3334	AGAUAAAA	CUGAUGA	X	GAA	AAUGUUUC	GAAACAUUC	UUUUUAUCU
	3336	UCAGAUAA	CUGAUGA	X	GAA	AGAAUGUU	AACAUUCUU	UUAUCUGA
	3337	CUCAGAU	CUGAUGA	X	GAA	AAGAAUGU	ACAUUCUUU	UAUCUGAG
	3338	UCUCAGAU	CUGAUGA	X	GAA	AAAGAAUG	CAUUCUUUU	AUCUGAGA
	3339	UUCUCAGA	CUGAUGA	X	GAA	AAAAGAAU	AUUCUUUUU	UCUGAGAA
30	3341	UGUUCUCA	CUGAUGA	X	GAA	AUAAAAGA	UCUUUUUAUC	UGAGAACA
	3363	AAAUACAC	CUGAUGA	X	GAA	AUCUUCAC	GUGAAGAUU	UGUGAUUU
	3364	AAAUCAC	CUGAUGA	X	GAA	AAUCUUCA	UGAAGAUUU	GUGAUUUU
	3370	AAGGCCAA	CUGAUGA	X	GAA	AUCACAAA	UUUGUGAUU	UUGGCCUU

	3371	CAAGGCCA	CUGAUGA	X	GAA	AAUCACAA	UUGUGAUUU	UGGCCUUG
	3372	GCAAGGCC	CUGAUGA	X	GAA	AAAUCACA	UGUGAUUUU	GGCCUUGC
	3378	UCCCCGGC	CUGAUGA	X	GAA	AGGCCAAA	UUUGGCCUU	GCCCGGGA
	3388	CUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGAUA	UUUAUAAG
5	3390	UUCUUAUA	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUAUU	UAUAAGAA
	3391	GUUCUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUAUUU	AUAAGAAC
	3392	GGUUCUUA	CUGAUGA	X	GAA	AAAUAUCC	GGUAUUUUA	UAAGAACC
	3394	GGGGUUCU	CUGAUGA	X	GAA	AUAAAUAU	AUAUUUAUA	AGAACCCC
	3406	UCUCACAU	CUGAUGA	X	GAA	AUCGGGGU	ACCCCGAUU	AUGUGAGA
10	3407	UUCUCACA	CUGAUGA	X	GAA	AAUCGGGG	CCCCGAUUA	UGUGAGAA
	3424	AAGUCGAG	CUGAUGA	X	GAA	AUCUCCUU	AAGGAGUAU	CUCGACUU
	3427	AGGAAGUC	CUGAUGA	X	GAA	AGUAUCUC	GAGAUACUC	GACUCCCU
	3432	UUCAGAGG	CUGAUGA	X	GAA	AGUCGAGU	ACUCGACUU	CCUCUGAA
	3433	UUUCAGAG	CUGAUGA	X	GAA	AAGUCGAG	CUCGACUUC	CUCUGAAA
15	3436	CCAUUUCA	CUGAUGA	X	GAA	AGGAAGUC	GACUCCUCU	UGAAAUGG
	3451	AGAUUCGG	CUGAUGA	X	GAA	AGCCAUCC	GGAUGGCUC	CCGAAUCU
	3458	CAAAGUAU	CUGAUGA	X	GAA	AUUCGGGA	UCCCGAAUC	UAUCUUUG
	3460	GUCAAAGA	CUGAUGA	X	GAA	AGAUUCGG	CCGAAUCUA	UCUUUGAC
	3462	UUGUCAAA	CUGAUGA	X	GAA	AUAGAUUC	GAAUCUAUC	UUUGACAA
20	3464	UUUUGUCA	CUGAUGA	X	GAA	AGAUAGAU	AUCUAUCUU	UGACAAAA
	3465	AUUUUGUC	CUGAUGA	X	GAA	AAGAUAGA	UCUAUCUUU	GACAAAAU
	3474	GUGCUGUA	CUGAUGA	X	GAA	AUUUUGUC	GACAAAAUC	UACAGCAC
	3476	UGGUGCUG	CUGAUGA	X	GAA	AGAUUUUG	CAAAAUCUA	CAGCACCA
	3500	CUCCGUAA	CUGAUGA	X	GAA	ACCACACG	CGUGUGGUC	UUACGGAG
25	3502	UACUCCGU	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUU	ACGGAGUA
	3503	AUACUCCG	CUGAUGA	X	GAA	AAGACCAC	GUGGUCUUA	CGGAGUAU
	3510	CACAGCAA	CUGAUGA	X	GAA	ACUCCGUA	UACGGAGUA	UUGCUGUG
	3512	CCCACAGC	CUGAUGA	X	GAA	AUACUCCG	CGGAGUAUU	GCUGUGGG
	3525	AAGGAGAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUC	UUCUCCUU
30	3527	CUAAGGAG	CUGAUGA	X	GAA	AGAUUJCC	GGAAAUCUU	CUCCUUAG
	3528	CCUAAGGA	CUGAUGA	X	GAA	AAGAUJUC	GAAAUCUUC	UCCUUAGG
	3530	CACCUAAG	CUGAUGA	X	GAA	AGAAGAUU	AAUCUUCUC	CUUAGGUG
	3533	ACCCACCU	CUGAUGA	X	GAA	AGGAGAAG	CUUCUCCUU	AGGUGGGU

	3534	GACCCACC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUA	GGUGGGUC
	3542	GGUAUGGA	CUGAUGA	X	GAA	ACCCACCU	AGGUGGGUC	UCCAUACC
	3544	UGGGUAUG	CUGAUGA	X	GAA	AGACCCAC	GUGGGUCUC	CAUACCCA
	3548	CUCCUGGG	CUGAUGA	X	GAA	AUGGAGAC	GUCUCCAUA	CCCAGGAG
5	3558	UCCAUUUG	CUGAUGA	X	GAA	ACUCCUGG	CCAGGAGUA	CAAAUGGA
	3575	GACUGCAA	CUGAUGA	X	GAA	AGUCCUCA	UGAGGACUU	UUGCAGUC
	3576	CGACUGCA	CUGAUGA	X	GAA	AAGUCCUC	GAGGACUUU	UGCAGUCG
	3577	GCGACUGC	CUGAUGA	X	GAA	AAAGUCCU	AGGACUUUU	GCAGUCGC
	3583	CCUCAGGC	CUGAUGA	X	GAA	ACUGCAAA	UUUGCAGUC	GCCUGAGG
10	3613	GUACUCAG	CUGAUGA	X	GAA	AGCUCUCA	UGAGAGCUC	CUGAGUAC
	3620	GAGUAGAG	CUGAUGA	X	GAA	ACUCAGGA	UCCUGAGUA	CUCUACUC
	3623	CAGGAGUA	CUGAUGA	X	GAA	AGUACUCA	UGAGUACUC	UACUCCUG
	3625	UUCAGGAG	CUGAUGA	X	GAA	AGAGUACU	AGUACUCUA	CUCCUGAA
	3628	GAUJUCAG	CUGAUGA	X	GAA	AGUAGAGU	ACUCUACUC	CUGAAAUC
15	3636	AUCUGAUA	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUC	UAUCAGAU
	3638	UGAUCUGA	CUGAUGA	X	GAA	AGAUUUCA	UGAAAUCUA	UCAGAUCA
	3640	CAUGAUCU	CUGAUGA	X	GAA	AUAGAUUU	AAAUUCUAUC	AGAUCAUG
	3645	UCCAGCAU	CUGAUGA	X	GAA	AUCUGAUA	UAUCAGAU	AUGCUGGA
	3689	GUUCUGCA	CUGAUGA	X	GAA	AUCUUGGC	GCCAAGAUU	UGCAGAAC
20	3690	AGUUCUGC	CUGAUGA	X	GAA	AAUCUUGG	CCAAGAUUU	GCAGAACU
	3699	UUUCCAC	CUGAUGA	X	GAA	AGUUCUGC	GCAGAACUU	GUGGAAAA
	3711	AAAUACC	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUA	GGUGAUUU
	3718	UUGAAGCA	CUGAUGA	X	GAA	AUCACCUA	UAGGUGAUU	UGCUUCAA
	3719	CUUGAAGC	CUGAUGA	X	GAA	AAUCACCU	AGGUGAUUU	GCUUCAAG
25	3723	UUUGCUG	CUGAUGA	X	GAA	AGCAAAUC	GAUUUGCUU	CAAGCAAA
	3724	AUUUGCUU	CUGAUGA	X	GAA	AAGCAAAU	AUUUGCUUC	AAGCAAAU
	3735	UCCUGUUG	CUGAUGA	X	GAA	ACAUUUGC	GCAAAUGUA	CAACAGGA
	3748	GUAGUCUU	CUGAUGA	X	GAA	ACCAUCCU	AGGAUGGUA	AAGACUAC
	3755	UUGGGAUG	CUGAUGA	X	GAA	AGUCUUUA	UAAAGACUA	CAUCCCAA
30	3759	UUGAUUGG	CUGAUGA	X	GAA	AUGUAGUC	GACUACAUC	CCAAUCAA
	3765	AUGGCAUU	CUGAUGA	X	GAA	AUUGGGAU	AUCCCAAUC	AAUGCCAU
	3774	CCUGUCAG	CUGAUGA	X	GAA	AUGGCAUU	AAUGCCAUA	CUGACAGG
	3787	AAACCCAC	CUGAUGA	X	GAA	AUUUCCUG	CAGGAAUA	GUGGGUUU

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	3794	AGUAUGUA	CUGAUGA	X	GAA	ACCCACUA	UAGUGGGUU	UACAUACU
	3795	GAGUAUGU	CUGAUGA	X	GAA	AACCCACU	AGUGGGUUU	ACAUACUC
	3796	UGAGUAUG	CUGAUGA	X	GAA	AAACCCAC	GUGGGUUUA	CAUACUCA
	3800	GAGUUGAG	CUGAUGA	X	GAA	AUGUAAAC	GUUUACAU	CUCAACUC
5	3803	CAGGAGUU	CUGAUGA	X	GAA	AGUAUGUA	UACAUACUC	AACUCCUG
	3808	GAAGGCAG	CUGAUGA	X	GAA	AGUUGAGU	ACUCAACUC	CUGCCUUC
	3815	CCUCAGAG	CUGAUGA	X	GAA	AGGCAGGA	UCCUGCCUU	CUCUGAGG
	3816	UCCUCAGA	CUGAUGA	X	GAA	AAGGCAGG	CCUGCCUUC	UCUGAGGA
	3818	AGUCCUCA	CUGAUGA	X	GAA	AGAAGGCA	UGCCUUCUC	UGAGGACU
10	3827	CCUUGAAG	CUGAUGA	X	GAA	AGUCCUCA	UGAGGACUU	CUUCAAGG
	3828	UCCUUGAA	CUGAUGA	X	GAA	AAGUCCUC	GAGGACUUC	UUCAAGGA
	3830	UUUCCUUG	CUGAUGA	X	GAA	AGAAGUCC	GGACUUCUU	CAAGGAAA
	3831	CUUCCUUU	CUGAUGA	X	GAA	AAGAAGUC	GACUUCUUC	AAGGAAAG
	3841	AGCUGAAA	CUGAUGA	X	GAA	ACUUUCCU	AGGAAAGUA	UUUCAGCU
15	3843	GGAGCUGA	CUGAUGA	X	GAA	AUACUUUC	GAAAGUAUU	UCAGCUCC
	3844	CGGAGCUG	CUGAUGA	X	GAA	AAUACUUU	AAAGUAUUU	CAGCUCCG
	3845	UCGGAGCU	CUGAUGA	X	GAA	AAAUACUU	AAGUAUUUC	AGCUCCGA
	3850	AAACUUCG	CUGAUGA	X	GAA	AGCUGAAA	UUUCAGCUC	CGAAGUUU
	3857	CUGAAUUA	CUGAUGA	X	GAA	ACUUCGGA	UCCGAAGUU	UAAUUCAG
20	3858	CCUGAAUU	CUGAUGA	X	GAA	AACUUCGG	CCGAAGUUU	AAUUCAGG
	3859	UCCUGAAU	CUGAUGA	X	GAA	AAACUUCG	CGAAGUUUA	AUUCAGGA
	3862	GCUUCCUG	CUGAUGA	X	GAA	AUUAAACU	AGUUUAAUU	CAGGAAGC
	3863	AGCUUCCU	CUGAUGA	X	GAA	AAUUAAC	GUUUAAUUC	AGGAAGCU
	3872	CAUCAUCA	CUGAUGA	X	GAA	AGCUUCCU	AGGAAGCUC	UGAUGAUG
25	3882	ACAUAUUCU	CUGAUGA	X	GAA	ACAUCAUC	GAUGAUGUC	AGAUUGU
	3887	CAUUUACA	CUGAUGA	X	GAA	AUCUGACA	UGUCAGUA	UGUAAAUG
	3891	AAAGCAUU	CUGAUGA	X	GAA	ACAUAUUCU	AGAUUGUA	AAUGCUUU
	3898	GAACUUGA	CUGAUGA	X	GAA	AGCAUUUA	UAAUGCUU	UCAAGUUC
	3899	UGAACUUG	CUGAUGA	X	GAA	AAGCAUUU	AAAUUGCUU	CAAGUUCA
30	3900	AUGAACUU	CUGAUGA	X	GAA	AAAGCAUU	AAUGCUUUC	AAGUUCAU
	3905	GGCUCAUG	CUGAUGA	X	GAA	ACUUGAAA	UUUCAAGUU	CAUGAGCC
	3906	AGGCUCAU	CUGAUGA	X	GAA	AACUUGAA	UUCAAGUUC	AUGAGCCU
	3924	AAGGUUUU	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUC	AAAACCUU

	3932	GUUCUJCA	CUGAUGA	X	GAA	AGGUUUUG	CAAAACCUU	UGAAGAAC
	3933	AGUUCUUC	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUU	GAAGAACU
	3942	UUCGGUAA	CUGAUGA	X	GAA	AGUUCUUC	GAAGAACUU	UUACCGAA
	3943	AUUCGGUA	CUGAUGA	X	GAA	AAGUUCUU	AAGAACUUU	UACCGAAU
5	3944	CAUUCGGU	CUGAUGA	X	GAA	AAAGUUCU	AGAACUUUU	ACCGAAUG
	3945	GCAUUCGG	CUGAUGA	X	GAA	AAAAGUUC	GAACUUUUA	CCGAAUGC
	3959	CAAACAUG	CUGAUGA	X	GAA	AGGUGGCA	UGCCACCUC	CAUGUUUG
	3965	AGUCAUCA	CUGAUGA	X	GAA	ACAUGGAG	CUCCAUGUU	UGAUGACU
	3966	UAGUCAUC	CUGAUGA	X	GAA	AACAUGGA	UCCAUGUUU	GAUGACUA
10	3974	CGCCCUGG	CUGAUGA	X	GAA	AGUCAUCA	UGAUGACUA	CCAGGGCG
	3994	GGCCAACA	CUGAUGA	X	GAA	AGUGCUGC	GCAGCACUC	UGUUGGCC
	3998	GAGAGGCC	CUGAUGA	X	GAA	ACAGAGUG	CACUCUGUU	GGCCUCUC
	4004	GCAUGGGA	CUGAUGA	X	GAA	AGGCCAAC	GUUGGCCUC	UCCCAUGC
	4006	CAGCAUGG	CUGAUGA	X	GAA	AGAGGCCA	UGGCCUCUC	CCAUGCUG
15	4022	UCCAGGUG	CUGAUGA	X	GAA	AGCGCUUC	GAAGCGCUU	CACCUGGA
	4023	GUCCAGGU	CUGAUGA	X	GAA	AAGCGCUU	AAGCGCUUC	ACCUGGAC
	4052	UCUUGAGC	CUGAUGA	X	GAA	AGGCCUUG	CAAGGCCUC	GCUCAAGA
	4056	UCAAUCUU	CUGAUGA	X	GAA	AGCGAGGC	GCCUCGCUC	AAGAUUGA
	4062	CUCAAGUC	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUU	GACUUGAG
20	4067	UUACUCUC	CUGAUGA	X	GAA	AGUCAAUC	GAUUGACUU	GAGAGUAA
	4074	UUACUGGU	CUGAUGA	X	GAA	ACUCUCAA	UUGAGAGUA	ACCAGUAA
	4081	CUUACUUU	CUGAUGA	X	GAA	ACUGGUUA	UAACCAGUA	AAAGUAAG
	4087	CGACUCCU	CUGAUGA	X	GAA	ACUUUUAC	GUAAAAGUA	AGGAGUCG
	4094	ACAGCCCC	CUGAUGA	X	GAA	ACUCCUUA	UAAGGAGUC	GGGGCUGU
25	4103	UGACAUCA	CUGAUGA	X	GAA	ACAGCCCC	GGGGCUGUC	UGAUGUCA
	4110	GGCCUGCU	CUGAUGA	X	GAA	ACAUCAGA	UCUGAUGUC	AGCAGGCC
	4123	AUGGCAGA	CUGAUGA	X	GAA	ACUGGGCC	GGCCCAGUU	UCUGCCAU
	4124	AAUGGCAG	CUGAUGA	X	GAA	AACUGGGC	GCCCAGUUU	CUGCCAUU
	4125	GAAUGGCA	CUGAUGA	X	GAA	AAACUGGG	CCCAGUUUC	UGCCAUUC
30	4132	ACAGCUGG	CUGAUGA	X	GAA	AUGGCAGA	UCUGCCAUU	CCAGCUGU
	4133	CACAGCUG	CUGAUGA	X	GAA	AAUGGCAG	CUGCCAUUC	CAGCUGUG
	4149	CCUUCGCU	CUGAUGA	X	GAA	ACGUGCCC	GGGCACGUC	AGCGAAGG
	4169	CGUAGGUG	CUGAUGA	X	GAA	ACCUGCGC	GCGCAGGUU	CACCUACG



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	4170	UCGUAGGU	CUGAUGA	X	GAA	AACCUGCG	CGCAGGUUC	ACCUACGA
	4175	CGUGGUCG	CUGAUGA	X	GAA	AGGUGAAC	GUUCACCUA	CGACCACG
	4203	CAGCACGC	CUGAUGA	X	GAA	AUUUCCU	AGGAAAUC	GCGUGCUG
	4214	GGGGCGGG	CUGAUGA	X	GAA	AGCAGCAC	GUGCUGCUC	CCCGCCCC
5	4229	CCGAGUUG	CUGAUGA	X	GAA	AGUCUGGG	CCCAGACUA	CAACUCGG
	4235	GGACCACC	CUGAUGA	X	GAA	AGUUGUAG	CUACAACUC	GGUGGUCC
	4242	GAGUACAG	CUGAUGA	X	GAA	ACCACCGA	UCGGUGGUC	CUGUACUC
	4247	GGGUGGAG	CUGAUGA	X	GAA	ACAGGACC	GGUCCUGUA	CUCCACCC
	4250	GUGGGGUG	CUGAUGA	X	GAA	AGUACAGG	CCUGUACUC	CACCCCAC
10	4263	AAACUCUA	CUGAUGA	X	GAA	AUGGGUGG	CCACCCAUC	UAGAGUUU
	4265	UCAAACUC	CUGAUGA	X	GAA	AGAUGGGU	ACCCAUCUA	GAGUUUGA
	4270	UCGUGUCA	CUGAUGA	X	GAA	ACUCUAGA	UCUAGAGUU	UGACACGA
	4271	UUCGUGUC	CUGAUGA	X	GAA	AACUCUAG	CUAGAGUUU	GACACGAA
	4284	CUAGAAAU	CUGAUGA	X	GAA	AGGCUUCG	CGAAGCCUU	AUUUCUAG
15	4285	UCUAGAAA	CUGAUGA	X	GAA	AAGGCUUC	GAAGCCUUA	UUUCUAGA
	4287	CUUCUAGA	CUGAUGA	X	GAA	AUAAGGCU	AGCCUUAUU	UCUAGAAG
	4288	GCUUCUAG	CUGAUGA	X	GAA	AAUAAGGC	GCCUUAUUU	CUAGAAGC
	4289	UGCUCUA	CUGAUGA	X	GAA	AAAUAAGG	CCUUAUUUC	UAGAAGCA
	4291	UGUGCUUC	CUGAUGA	X	GAA	AGAAUAA	UUUUUUA	GAAGCACA
20	4305	GGUAUAAA	CUGAUGA	X	GAA	ACACAUGU	ACAUGUGUA	UUUAUACC
	4307	GGGGUAUA	CUGAUGA	X	GAA	AUACACAU	AUGUGUAUU	UAUACCCC
	4308	GGGGGUUA	CUGAUGA	X	GAA	AAUACACA	UGUGUAUUU	AUACCCCC
	4309	UGGGGGUA	CUGAUGA	X	GAA	AAUACAC	GUGUAUUUA	UACCCCCA
	4311	CCUGGGGG	CUGAUGA	X	GAA	AUAAUAC	GUAUUUAUA	CCCCCAGG
25	4325	GCAAAAGC	CUGAUGA	X	GAA	AGUUUCCU	AGGAAACUA	GCUUUUGC
	4329	ACUGGCAA	CUGAUGA	X	GAA	AGCUAGUU	AACUAGCUU	UUGCCAGU
	4330	UACUGGCA	CUGAUGA	X	GAA	AAGCUAGU	ACUAGCUUU	UGCCAGUA
	4331	AUACUGGC	CUGAUGA	X	GAA	AAAGCUAG	CUAGCUUUU	GCCAGUAU
	4338	AUGCAUAA	CUGAUGA	X	GAA	ACUGGCAA	UUGCCAGUA	UUAUGCAU
30	4340	AUAUGCAU	CUGAUGA	X	GAA	AUACUGGC	GCCAGUAUU	AUGCAUUA
	4341	UAUAUGCA	CUGAUGA	X	GAA	AAUACUGG	CCAGUAUUA	UGCAUUAU
	4347	AACUUUAU	CUGAUGA	X	GAA	AUGCAUAA	UUAUGCAUA	UAUAAGUU
	4349	UAAACUUA	CUGAUGA	X	GAA	AUAUGCAU	AUGCAUUA	UAAGUUUA

	4351	UGUAAACU	CUGAUGA	X	GAA	AUAUAUGC	GCAUAUAUA	AGUUUACA
	4355	AAGGUGUA	CUGAUGA	X	GAA	ACUUUAU	AUAUAAGUU	UACACCUU
	4356	AAAGGUGU	CUGAUGA	X	GAA	AACUUUAU	UAUAAGUUU	ACACCUUU
	4357	UAAAGGUG	CUGAUGA	X	GAA	AAACUUU	AUAAGUUUA	CACCUUUA
5	4363	GAAAGUA	CUGAUGA	X	GAA	AGGUGUAA	UUACACCUU	UAUCUUUC
	4364	GGAAAGAU	CUGAUGA	X	GAA	AAGGUGUA	UACACCUUU	AUCUUUCC
	4365	UGGAAAGA	CUGAUGA	X	GAA	AAAGGUGU	ACACCUUUA	UCUUUCCA
	4367	CAUGGAAA	CUGAUGA	X	GAA	AUAAAGGU	ACCUUUAUC	UUUCCAUG
	4369	CCCAUGGA	CUGAUGA	X	GAA	AGAUAAAG	CUUUAUCUU	UCCAUGGG
10	4370	UCCCAUGG	CUGAUGA	X	GAA	AAGAUAAA	UUUAUCUUU	CCAUGGGA
	4371	CUCCCAUG	CUGAUGA	X	GAA	AAAGAUAA	UUAUCUUUC	CAUGGGAG
	4389	AUCACAAA	CUGAUGA	X	GAA	AGCAGCUG	CAGCUGCUU	UUUGUGAU
	4390	AAUCACAA	CUGAUGA	X	GAA	AAGCAGCU	AGCUGCUUU	UUUGUGAUU
	4391	AAAUCACA	CUGAUGA	X	GAA	AAAGCAGC	GCUGCUUUU	UGUGAUUU
15	4392	AAAAUCAC	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUU	GUGAUUUU
	4398	AUUAAAAA	CUGAUGA	X	GAA	AUCACAAA	UUUGUGAUU	UUUUUAAU
	4399	UAUUAAAA	CUGAUGA	X	GAA	AAUCACAA	UUUGUGAUU	UUUUAAUA
	4400	CUAUUAAA	CUGAUGA	X	GAA	AAAUCACA	UGUGAUUUU	UUUAAUAG
	4401	ACUAUUAA	CUGAUGA	X	GAA	AAAAUCAC	GUGAUUUUU	UUAAUAGU
20	4402	CACUAUUA	CUGAUGA	X	GAA	AAAAAUCA	UGAUUUUUU	UAAUAGUG
	4403	GCACUAUU	CUGAUGA	X	GAA	AAAAAAUC	GAUUUUUUU	AAUAGUGC
	4404	AGCACUAU	CUGAUGA	X	GAA	AAAAAAAU	AUUUUUUUA	AUAGUGCU
	4407	AAAAGCAC	CUGAUGA	X	GAA	AUUAAAAA	UUUUUAAUA	GUGCUUUU
	4413	AAAAAAA	CUGAUGA	X	GAA	AGCACUAU	AUAGUGCUU	UUUUUUUU
25	4414	AAAAAAA	CUGAUGA	X	GAA	AAGCACUA	UAGUGCUUU	UUUUUUUU
	4415	CAAAAAA	CUGAUGA	X	GAA	AAAGCACU	AGUGCUUUU	UUUUUUUG
	4416	UCAAAAAA	CUGAUGA	X	GAA	AAAAGCAC	GUGCUUUUU	UUUUUUGA
	4417	GUCAAAAA	CUGAUGA	X	GAA	AAAAAGCA	UGCuuuuuu	UUUUUGAC
	4418	AGUCAAAA	CUGAUGA	X	GAA	AAAAAAGC	GCUUUUUUU	UUUUUGACU
30	4419	UAGUCAAA	CUGAUGA	X	GAA	AAAAAAAG	CUUUUUUUU	UUUGACUA
	4420	UUAGUCAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UUGACUAA
	4421	GUUAGUCA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UGACUAAC
	4422	UGUUAGUC	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	GACUAACA

	4427	AUUCUUGU	CUGAUGA	X	GAA	AGUCAAAA	UUUUGACUA	ACAAGAAU
	4438	UCUGGAGU	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	ACUCCAGA
	4442	UCUAUCUG	CUGAUGA	X	GAA	AGUUACAU	AUGUAACUC	CAGAUAGA
	4448	UAUUUCUC	CUGAUGA	X	GAA	AUCUGGAG	CUCCAGAUU	GAGAAUAU
5	4456	CUUGUCAC	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUA	GUGACAAG
	4476	UUUAGCAG	CUGAUGA	X	GAA	AGUGUUCU	AGAACACUA	CUGCUAAA
	4482	UGAGGAUU	CUGAUGA	X	GAA	AGCAGUAG	CUACUGCUA	AAUCCUCA
	4486	AACAUGAG	CUGAUGA	X	GAA	AUUUAGCA	UGCUGAAAUC	CUCAUGUU
	4489	AGUAACAU	CUGAUGA	X	GAA	AGGAUUUA	UAAAUCCUC	AUGUUACU
10	4494	CACUGAGU	CUGAUGA	X	GAA	ACAUGAGG	CCUCAUGUU	ACUCAGUG
	4495	ACACUGAG	CUGAUGA	X	GAA	AACAUGAG	CUCAUGUUA	CUCAGUGU
	4498	CUAACACU	CUGAUGA	X	GAA	AGUAACAU	AUGUUACUC	AGUGUUAG
	4504	AUUUCUCU	CUGAUGA	X	GAA	ACACUGAG	CUCAGUGUU	AGAGAAAU
	4505	GAUUUCUC	CUGAUGA	X	GAA	AACACUGA	UCAGUGUUA	GAGAAAUC
15	4513	UUAGGAAG	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAUC	CUUCCUAA
	4516	GGUUUAGG	CUGAUGA	X	GAA	AGGAUUUC	GAAAUCCUU	CCUAAACC
	4517	GGGUUUAG	CUGAUGA	X	GAA	AAGGAUUU	AAAUCCUUC	CUAAACCC
	4520	AUUGGGUU	CUGAUGA	X	GAA	AGGAAGGA	UCCUCCCUA	AACCCAAU
	4533	GAGCAGGG	CUGAUGA	X	GAA	AGUCAUUG	CAAUGACUU	CCCUGCUC
20	4534	GGAGCAGG	CUGAUGA	X	GAA	AAGUCAUU	AAUGACUUC	CCUGCUCC
	4541	GGGGGUUG	CUGAUGA	X	GAA	AGCAGGGA	UCCCUGCUC	CAACCCCC
	4557	CGUGCCCU	CUGAUGA	X	GAA	AGGUGGCG	CGCCACCUC	AGGGCACG
	4576	CUCAAUCA	CUGAUGA	X	GAA	ACUGGUCC	GGACCAGUU	UGAUUGAG
	4577	CCUCAAUC	CUGAUGA	X	GAA	AACUGGUC	GACCAGUUU	GAUUGAGG
25	4581	AGCUCCUC	CUGAUGA	X	GAA	AUCAAAUC	AGUUUGAUU	GAGGAGCU
	4598	CAUUGGGU	CUGAUGA	X	GAA	AUCAGUGC	GCACUGAUC	ACCCAAUG
	4610	GGGUACGU	CUGAUGA	X	GAA	AUGCAUUG	CAAUGCAUC	ACGUACCC
	4615	CAGUGGGG	CUGAUGA	X	GAA	ACGUGAUG	CAUCACGUA	CCCCACUG
	4664	CUGGGGCU	CUGAUGA	X	GAA	ACGGGCUU	AAGCCCGUU	AGCCCCAG
30	4665	CCUGGGGC	CUGAUGA	X	GAA	AACGGGCU	AGCCCGUUA	GCCCCAGG
	4678	CAGCCAGU	CUGAUGA	X	GAA	AUCCCCUG	CAGGGGAUC	ACUGGCUG
	4700	ACUCCCGA	CUGAUGA	X	GAA	AUGUUGCU	AGCAACAUC	UCGGGAGU
	4702	GGACUCCC	CUGAUGA	X	GAA	AGAUGUUG	CAACAUCUC	GGGAGUCC

	4709	UGC	UAGAG	CUGAUGA	X	GAA	ACUCCCGA	UCGGGAGUC	CUCUAGCA
	4712	GCC	UGCUA	CUGAUGA	X	GAA	AGGACUCC	GGAGUCCUC	UAGCAGGC
	4714	AGG	CCUGC	CUGAUGA	X	GAA	AGAGGACU	AGUCCUCUA	GCAGGCCU
	4723	ACA	UGUCU	CUGAUGA	X	GAA	AGGCCUGC	GCAGGCCUA	AGACAUGU
5	4802	GCG	UCUCA	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUU	UGAGACGC
	4803	UGC	GUCUC	CUGAUGA	X	GAA	AAUUCUUU	AAAGAAUUU	GAGACGCA
	4840	GCA	UUGCU	CUGAUGA	X	GAA	AGCCCCGU	ACGGGGCUC	AGCAAUGC
	4852	GCC	ACUGA	CUGAUGA	X	GAA	AUGGCAUU	AAUGCCAUU	UCAGUGGC
	4853	AGC	CACUG	CUGAUGA	X	GAA	AAUGGCAU	AUGCCAUUU	CAGUGGCU
10	4854	AAG	CCACU	CUGAUGA	X	GAA	AAAUGGCA	UGCCAUUUC	AGUGGCUU
	4862	GAG	CUGGG	CUGAUGA	X	GAA	AGCCACUG	CAGUGGCUU	CCCAGCUC
	4863	AGA	GCUGG	CUGAUGA	X	GAA	AAGCCACU	AGUGGCUUC	CCAGCUCU
	4870	AAG	GGUCA	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCUC	UGACCCUU
	4878	AAA	UGUAG	CUGAUGA	X	GAA	AGGGUCAG	CUGACCCUU	CUACAUUU
15	4879	CAA	AUGUA	CUGAUGA	X	GAA	AAGGGUCA	UGACCCUUC	UACAUUUG
	4881	CUCA	AAUG	CUGAUGA	X	GAA	AGAAGGGU	ACCCUUCUA	CAUUGAG
	4885	GGC	CCUCA	CUGAUGA	X	GAA	AUGUAGAA	UUCUACAUU	UGAGGGCC
	4886	GGG	CCCUC	CUGAUGA	X	GAA	AAUGUAGA	UCUACAUUU	GAGGGCCC
	4929	AUC	CAGAA	CUGAUGA	X	GAA	AUGUCCCC	GGGGACAUU	UUCUGGAU
20	4930	AAU	CCAGA	CUGAUGA	X	GAA	AAUGUCCC	GGGACAUUU	UCUGGAUU
	4931	GAA	UCCAG	CUGAUGA	X	GAA	AAAUGUCC	GGACAUUUU	CUGGAUUC
	4932	AGA	AUCCA	CUGAUGA	X	GAA	AAAUGUC	GACAUUUUC	UGGAUUCU
	4938	CCU	CCCAG	CUGAUGA	X	GAA	AUCCAGAA	UUCUGGAUU	CUGGGAGG
	4939	GCC	UCCA	CUGAUGA	X	GAA	AAUCCAGA	UCUGGAUUC	UGGGAGGC
25	4963	AAAA	AAGA	CUGAUGA	X	GAA	AUUUGUCC	GGACAAUAU	UCUUUUUU
	4965	CCAA	AAAAA	CUGAUGA	X	GAA	AUAUUUGU	ACAAUAUC	UUUUUUGG
	4967	UUCC	AAAA	CUGAUGA	X	GAA	AGAUUUU	AAUAUCUUU	UUUUGGAA
	4968	GUU	CCAAA	CUGAUGA	X	GAA	AAGAUUU	AAUAUCUUU	UUUGGAAC
	4969	AGU	UCCAA	CUGAUGA	X	GAA	AAAGAUUU	AUAUCUUUU	UUGGAACU
30	4970	UAG	UCCA	CUGAUGA	X	GAA	AAAAGAU	UAUCUUUUU	UGGAACUA
	4971	UUAG	UUC	CUGAUGA	X	GAA	AAAAGAU	AUCUUUUUU	GGAACUA
	4978	AUU	UGCUU	CUGAUGA	X	GAA	AGUCCAA	UUGGAACUA	AAGCAAU
	4987	AGG	UCUAA	CUGAUGA	X	GAA	AUUUGCUU	AAGCAAUUU	UUAGACCU

4988	AAGGUCUA	CUGAUGA	X	GAA	AAUUUGCU	AGCAAAUUU	UAGACCUU
4989	AAAGGUCU	CUGAUGA	X	GAA	AAAUUUGC	GCAAAUUUU	AGACCUUU
4990	UAAAGGUC	CUGAUGA	X	GAA	AAAAUUUG	CAAAUUUUA	GACCUUUA
4996	CAUAGGUA	CUGAUGA	X	GAA	AGGUCUAA	UUAGACCUU	UACCUAUG
5	4997	CCAUAGGU	X	GAA	AAGGUCUA	UAGACCUUU	ACCUAUGG
	4998	UCCAUAGG	X	GAA	AAAGGUCU	AGACCUUUA	CCUAUGGA
	5002	CACUCCA	X	GAA	AGGUAAAG	CUUUACCUA	UGGAAGUG
	5013	GGACAUAG	X	GAA	ACCACUUC	GAAGUGGUU	CUAUGUCC
	5014	UGGACAU	X	GAA	AACCACUU	AAGUGGUUC	UAUGUCCA
10	5016	AAUGGACA	X	GAA	AGAACCAC	GUGGUUCUA	UGUCCAUU
	5020	UGAGAAUG	X	GAA	ACAUAGAA	UUCUAUGUC	CAUUCUCA
	5024	CGAAUGAG	X	GAA	AUGGACAU	AUGUCCAUU	CUCAUUCG
	5025	ACGAAUGA	X	GAA	AAUGGACA	UGUCCAUUC	UCAUUCGU
	5027	CCACGAAU	X	GAA	AGAAUGGA	UCCAUUCUC	AUUCGUGG
15	5030	AUGCCACG	X	GAA	AUGAGAAU	AUUCUCAUU	CGUGGCAU
	5031	CAUGCCAC	X	GAA	AAUGAGAA	UUCUCAUUC	GUGGCAUG
	5041	CAAAUCAA	X	GAA	ACAUGCCA	UGGCAUGUU	UGAUUUUG
	5042	ACAAAUCA	X	GAA	AACAUGCC	GGCAUGUUU	UGAUUUUGU
	5043	UACAAAUC	X	GAA	AAACAUGC	GCAUGUUUU	GAUUUGUA
20	5047	GUGCUACA	X	GAA	AUCAAAC	GUUUUGAUU	UGUAGCAC
	5048	AGUGCUAC	X	GAA	AAUCAAAA	UUUUGAUUU	GUAGCACU
	5051	CUCAGUGC	X	GAA	ACAAAUCA	UGAUUUUGA	GCACUGAG
	5069	UCAGAGUU	X	GAA	AGUGCCAC	GUGGCACUC	AACUCUGA
	5074	UGGGCUCA	X	GAA	AGUUGAGU	ACUCAACUC	UGAGCCCA
25	5084	GCCAAAAG	X	GAA	AUGGGCUC	GAGCCCAUA	CUUUUGGC
	5087	GGAGCCAA	X	GAA	AGUAUGGG	CCCAUACUU	UUGGCUCU
	5088	AGGAGCCA	X	GAA	AAGUAUGG	CCAUACUUU	UGGCUCUU
	5089	GAGGAGCC	X	GAA	AAAGUAUG	CAUACUUUU	GGCUCUUC
	5094	UACUAGAG	X	GAA	AGCCAAAA	UUUUGGCUC	CUCUAGUA
30	5097	UCUUACUA	X	GAA	AGGAGCCA	UGGCUCUUC	UAGUAAGA
	5099	CAUCUUAC	X	GAA	AGAGGAGC	GCUCUUCUA	GUAAGAUG
	5102	GUGCAUCU	X	GAA	ACUAGAGG	CCUCUAGUA	AGAUGCAC
	5119	CUCUGGCU	X	GAA	AGUUUUCA	UGAAAACUU	AGCCAGAG

5120	ACUCUGGC	CUGAUGA	X	GAA	AAGUUUUC	GAAAACUUA	GCCAGAGU
5129	GACAACCU	CUGAUGA	X	GAA	ACUCUGGC	GCCAGAGUU	AGGUUGUC
5130	AGACAACC	CUGAUGA	X	GAA	AACUCUGG	CCAGAGUUA	GGUUGUCU
5134	CUGGAGAC	CUGAUGA	X	GAA	ACCUAACU	AGUUAGGUU	GUCUCCAG
5 5137	GGCCUGGA	CUGAUGA	X	GAA	ACAACCUA	UAGGUUGUC	UCCAGGCC
5139	AUGGCCUG	CUGAUGA	X	GAA	AGACAACC	GGUUGUCUC	CAGGCCAU
5156	UUCAGUGU	CUGAUGA	X	GAA	AGGCCAUC	GAUGGCCUU	ACACUGAA
5157	UUUCAGUG	CUGAUGA	X	GAA	AAGGCCAU	AUGGCCUUA	CACUGAAA
5170	UAGAAUGU	CUGAUGA	X	GAA	ACAUUUUC	GAAA AUGUC	ACAUUCUA
10 5175	CAAAAUAG	CUGAUGA	X	GAA	AUGUGACA	UGUCACAUU	CUAUUUUG
5176	CCAAAUA	CUGAUGA	X	GAA	AAUGUGAC	GUCACAUUC	UAUUUUGG
5178	ACCCAAA	CUGAUGA	X	GAA	AGAAUGUG	CACAUUCUA	UUUUGGGU
5180	AUACCCAA	CUGAUGA	X	GAA	AUAGAAUG	CAUUCUAUU	UUGGGU AU
5181	AAUACCCA	CUGAUGA	X	GAA	AAUAGAAU	AUUCUAUUU	UGGGUAUU
15 5182	UAAUACCC	CUGAUGA	X	GAA	AAAUAGAA	UUCUAUUUU	GGGU AUUA
5187	UAUAUUAA	CUGAUGA	X	GAA	ACCCAAA	UUUUGGGUA	UUAUAUA
5189	UAUAUAUU	CUGAUGA	X	GAA	AUACCCAA	UUGGGUAUU	AAUAUAUA
5190	CUAUAUAU	CUGAUGA	X	GAA	AAUACCCA	UGGGUAUUA	AUAUAUAG
5193	GGACUAUA	CUGAUGA	X	GAA	AUUA AUAC	GUAUUAUA	UAUAGUCC
20 5195	CUGGACUA	CUGAUGA	X	GAA	AUAUUA AU	AUUA AUUA	UAGUCCAG
5197	GUCUGGAC	CUGAUGA	X	GAA	AUAUAUUA	UAAUAUAUA	GUCCAGAC
5200	AGUGUCUG	CUGAUGA	X	GAA	ACUAUAUA	UAUAUAGUC	CAGACACU
5209	AUUGAGUU	CUGAUGA	X	GAA	AGUGUCUG	CAGACACUU	AACUCAAU
5210	AAUUGAGU	CUGAUGA	X	GAA	AAGUGUCU	AGACACUUA	ACUCAAUU
25 5214	AAGAAAUU	CUGAUGA	X	GAA	AGUUAAGU	ACUUAACUC	AAUUUCUU
5218	UACCAAGA	CUGAUGA	X	GAA	AUUGAGUU	AACUCAAUU	UCUUGGUA
5219	AUACCAAG	CUGAUGA	X	GAA	AAUUGAGU	ACUCAAUUU	CUUGGU AU
5220	AAUACCAA	CUGAUGA	X	GAA	AAAUUGAG	CUCAAUUUC	UUGGU AUU
5222	AUA AUACC	CUGAUGA	X	GAA	AGAA AUUG	CAAUUCUU	GGUAUUAU
30 5226	CAGAAUAA	CUGAUGA	X	GAA	ACCAAGAA	UUCUUGGUA	UUAUUCUG
5228	AACAGAAU	CUGAUGA	X	GAA	AUACCAAG	CUUGGU AUU	AUUCUGUU
5229	AAACAGAA	CUGAUGA	X	GAA	AAUACCAA	UUGGU AUUA	UUCUGUUU
5231	CAAAACAG	CUGAUGA	X	GAA	AUA AUACC	GGUAUUAUU	CUGUUUUG

5232	GCAAAACA	CUGAUGA	X	GAA	AAUAAUAC	GUAUUAUUC	UGUUUUGC	
5236	CUGUGCAA	CUGAUGA	X	GAA	ACAGAAUA	UAUUCUGUU	UUGCACAG	
5237	ACUGUGCA	CUGAUGA	X	GAA	AACAGAAU	AUUCUGUUU	UGCACAGU	
5238	AACUGUGC	CUGAUGA	X	GAA	AAACAGAA	UUCUGUUUU	GCACAGUU	
5	5246	UCACAACU	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUU	AGUUGUGA
	5247	UUCACAAC	CUGAUGA	X	GAA	AACUGUGC	GCACAGUUA	GUUGUGAA
	5250	UCUUUCAC	CUGAUGA	X	GAA	ACUAACUG	CAGUUAGUU	GUGAAAGA
	5284	CUCCUCAG	CUGAUGA	X	GAA	ACUGCAUU	AAUGCAGUC	CUGAGGAG
	5296	AUGGAGAA	CUGAUGA	X	GAA	ACUCUCCU	AGGAGAGUU	UUCUCCAU
10	5297	UAUGGAGA	CUGAUGA	X	GAA	AACUCUCC	GGAGAGUUU	UCUCCAUA
	5298	AUAUGGAG	CUGAUGA	X	GAA	AAACUCUC	GAGAGUUUU	CUCCAUAU
	5299	GAUAUGGA	CUGAUGA	X	GAA	AAAACUCU	AGAGUUUUC	UCCAUAUC
	5301	UUGAU AUG	CUGAUGA	X	GAA	AGAAAACU	AGUUUUCUC	CAUAUCAA
	5305	CGUUUUGA	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	UCAAACG
15	5307	CUCGUUUU	CUGAUGA	X	GAA	AUAUGGAG	CUCCAUAUC	AAAACGAG
	5336	ACCUUAUU	CUGAUGA	X	GAA	ACCUUUUU	AAAAAGGUC	AAUAAGGU
	5340	CUUGACCU	CUGAUGA	X	GAA	AUUGACCU	AGGUCAAUA	AGGUCAAG
	5345	CUUCCCUU	CUGAUGA	X	GAA	ACCUUAUU	AAUAAGGUC	AAGGGAAG
	5361	GGUAUAGA	CUGAUGA	X	GAA	ACGGGGUC	GACCCCGUC	UCUAUACC
20	5363	UUGGUUAU	CUGAUGA	X	GAA	AGACGGGG	CCCCGUCUC	UAUACCAA
	5365	GGUUGGUA	CUGAUGA	X	GAA	AGAGACGG	CCGUCUCUA	UACCAACC
	5367	UUGGUUGG	CUGAUGA	X	GAA	AUAGAGAC	GUCUCUAUA	CCAACCAA
	5382	UGUUGGUG	CUGAUGA	X	GAA	AUUGGUUU	AAACCAAUU	CACCAACA
	5383	GUGUUGGU	CUGAUGA	X	GAA	AAUUGGUU	AACCAAUUC	ACCAACAC
25	5395	UGGGUCCC	CUGAUGA	X	GAA	ACUGUGUU	AACACAGUU	GGGACCCA
	5417	ACGUGACU	CUGAUGA	X	GAA	ACUUCCUG	CAGGAAGUC	AGUCACGU
	5421	GGAAACGU	CUGAUGA	X	GAA	ACUGACUU	AAGUCAGUC	ACGUUUC
	5426	GAAAAGGA	CUGAUGA	X	GAA	ACGUGACU	AGUCACGUU	UCCUUUUC
	5427	UGAAAAGG	CUGAUGA	X	GAA	AACGUGAC	GUCACGUUU	CCUUUUA
30	5428	AUGAAAAG	CUGAUGA	X	GAA	AAACGUGA	UCACGUUUC	CUUUUCAU
	5431	UAAAUGAA	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUU	UUCAUUUA
	5432	UUAAAUGA	CUGAUGA	X	GAA	AAGGAAAC	GUUCCUUUU	UCAUUUAA
	5433	AUUAAAUG	CUGAUGA	X	GAA	AAAGGAAA	UUUCCUUUU	CAUUUAAU

	5434	CAUUAAAU	CUGAUGA	X	GAA	AAAAGGAA	UUCCUUUUC	AUUUAAUG
	5437	CCCCAUUA	CUGAUGA	X	GAA	AUGAAAAG	CUUUUCAUU	UAAUGGGG
	5438	UCCCCAUU	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUU	AAUGGGGA
	5439	AUCCCCAU	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUA	AUGGGGAU
5	5448	GAUAGUGG	CUGAUGA	X	GAA	AUCCCCAU	AUGGGGAUU	CCACUAUC
	5449	AGAUAGUG	CUGAUGA	X	GAA	AAUCCCCA	UGGGGAUUC	CACUAUCU
	5454	GUGUGAGA	CUGAUGA	X	GAA	AGUGGAAU	AUUCCACUA	UCUCACAC
	5456	UAGUGUGA	CUGAUGA	X	GAA	AUAGUGGA	UCCACUAUC	UCACACUA
	5458	AUUAGUGU	CUGAUGA	X	GAA	AGAUAGUG	CACUAUCUC	ACACUAAU
10	5464	UUUCAGAU	CUGAUGA	X	GAA	AGUGUGAG	CUCACACUA	AUCUGAAA
	5467	UCCUUUCA	CUGAUGA	X	GAA	AUUAGUGU	ACACUAAUC	UGAAAGGA
	5489	CGCCAGCU	CUGAUGA	X	GAA	AUGCUCUU	AAGAGCAUU	AGCUGGCG
	5490	GCGCCAGC	CUGAUGA	X	GAA	AAUGCUCU	AGAGCAUUA	GCUGGCGC
	5501	GUGCUIAA	CUGAUGA	X	GAA	AUGCGCCA	UGGCGCAUA	UUAAGCAC
15	5503	AAGUGCUU	CUGAUGA	X	GAA	AUAUGCGC	GCGCAUUAU	AAGCACUU
	5504	AAAGUGCU	CUGAUGA	X	GAA	AAUAUGCG	CGCAUUAUA	AGCACUUU
	5511	GGAGCUUA	CUGAUGA	X	GAA	AGUGCUIA	UAAGCACUU	UAAGCUCC
	5512	AGGAGCUU	CUGAUGA	X	GAA	AAGUGCUU	AAGCACUUU	AAGCUCCU
	5513	AAGGAGCU	CUGAUGA	X	GAA	AAAGUGCU	AGCACUUUA	AGCUCCUU
20	5518	UACUCAAG	CUGAUGA	X	GAA	AGCUUAAA	UUUAAGCUC	CUUGAGUA
	5521	UUUUACUC	CUGAUGA	X	GAA	AGGAGCUU	AAGCUCCUU	GAGUAAAA
	5526	CACCUUUU	CUGAUGA	X	GAA	ACUCAAGG	CCUUGAGUA	AAAAGGUG
	5537	AAAUUACA	CUGAUGA	X	GAA	ACCACCUU	AAGGUGGUA	UGUAAUUU
	5541	GCAUAAAU	CUGAUGA	X	GAA	ACAUACCA	UGGUAUGUA	AUUUAUGC
25	5544	CUUGCAUA	CUGAUGA	X	GAA	AUUACAUA	UAUGUAAUU	UAUGCAAG
	5545	CCUUGCAU	CUGAUGA	X	GAA	AAUUACAU	AUGUAAUUU	AUGCAAGG
	5546	ACCUUGCA	CUGAUGA	X	GAA	AAAUUACA	UGUAAUUUA	UGCAAGGU
	5555	UGGAGAAA	CUGAUGA	X	GAA	ACCUUGCA	UGCAAGGUA	UUUCUCCA
	5557	ACUGGAGA	CUGAUGA	X	GAA	AUACCUUG	CAAGGUUUU	UCUCCAGU
30	5558	AACUGGAG	CUGAUGA	X	GAA	AAUACCUU	AAGGUUUUU	CUCCAGUU
	5559	CAACUGGA	CUGAUGA	X	GAA	AAAUACCU	AGGUUUUUC	UCCAGUUG
	5561	CCCAACUG	CUGAUGA	X	GAA	AGAAAUAC	GUUUUUCUC	CAGUUGGG
	5566	UGAGUCCC	CUGAUGA	X	GAA	ACUGGAGA	UCUCCAGUU	GGGACUCA



	5573	AAUAUCCU	CUGAUGA	X	GAA	AGUCCCAA	UUGGGACUC	AGGAUAUU
	5579	UUAACUAA	CUGAUGA	X	GAA	AUCCUGAG	CUCAGGAUA	UUAGUUAA
	5581	CAUUAACU	CUGAUGA	X	GAA	AUAUCCUG	CAGGAUAUU	AGUUA AUG
	5582	UCAUUAAC	CUGAUGA	X	GAA	AAUAUCCU	AGGAUAUUA	GUUAAUGA
5	5585	GGCUCAUU	CUGAUGA	X	GAA	ACUAAUUA	AUAUUAGUU	AAUGAGCC
	5586	UGGCUCAU	CUGAUGA	X	GAA	AACUAAUA	UAUUAGUUA	AUGAGCCA
	5596	CUUCUAGU	CUGAUGA	X	GAA	AUGGCUCA	UGAGCCAUC	ACUAGAAG
	5600	UUUUCUUC	CUGAUGA	X	GAA	AGUGAUGG	CCAUCACUA	GAAGAAAA
	5615	CAGUUGAA	CUGAUGA	X	GAA	AUGGGCUU	AAGCCCAUU	UUCAACUG
10	5616	GCAGUUGA	CUGAUGA	X	GAA	AAUGGGCU	AGCCCAUUU	UCAACUGC
	5617	AGCAGUUG	CUGAUGA	X	GAA	AAAUGGGC	GCCCAUUUU	CAACUGCU
	5618	AAGCAGUU	CUGAUGA	X	GAA	AAAAUGGG	CCCAUUUUC	AACUGCUU
	5626	AAGUUUCA	CUGAUGA	X	GAA	AGCAGUUG	CAACUGCUU	UGAAACUU
	5627	CAAGUUUC	CUGAUGA	X	GAA	AAGCAGUU	AACUGCUUU	GAAACUUG
15	5634	CCCCAGGC	CUGAUGA	X	GAA	AGUUUCAA	UUGAAACUU	GCCUGGGG
	5644	CAUGCUCU	CUGAUGA	X	GAA	ACCCAGG	CCUGGGGUC	UGAGCAUG
	5661	UGUCUCCC	CUGAUGA	X	GAA	AUUCUCAU	AUGGGAAUA	GGGAGACA
	5674	CCCUUUC	CUGAUGA	X	GAA	ACCCUGUC	GACAGGGUA	GGAAAGGG
	5688	CUGAAGAG	CUGAUGA	X	GAA	AGGCGCCC	GGGCGCCUA	CUCUUCAG
20	5691	ACCCUGAA	CUGAUGA	X	GAA	AGUAGGCG	CGCCUACUC	UUCAGGGU
	5693	AGACCCUG	CUGAUGA	X	GAA	AGAGUAGG	CCUACUCUU	CAGGGUCU
	5694	UAGACCCU	CUGAUGA	X	GAA	AAGAGUAG	CUACUCUUC	AGGGUCUA
	5700	GAUCUUUA	CUGAUGA	X	GAA	ACCCUGAA	UUCAGGGUC	UAAAGAUC
	5702	UUGAUCUU	CUGAUGA	X	GAA	AGACCCUG	CAGGGUCUA	AAGAUCAA
25	5708	GCCCCACU	CUGAUGA	X	GAA	AUCUUUAG	CUAAAGAUC	AAGUGGGC
	5719	AGCGAUCC	CUGAUGA	X	GAA	AGGCCCCAC	GUGGGCCUU	GGAUCGCU
	5724	AGCUUAGC	CUGAUGA	X	GAA	AUCCAAGG	CCUUGGAUC	GCUAAGCU
	5728	AGCCAGCU	CUGAUGA	X	GAA	AGCGAUCC	GGAUCGCUA	AGCUGGCU
	5737	AUCAAACA	CUGAUGA	X	GAA	AGCCAGCU	AGCUGGCUC	UGUUUGAU
30	5741	UAGCAUCA	CUGAUGA	X	GAA	ACAGAGCC	GGCUCUGUU	UGAUGCUA
	5742	AUAGCAUC	CUGAUGA	X	GAA	AACAGAGC	GCUCUGUUU	GAUGCUAU
	5749	UGCAUAAA	CUGAUGA	X	GAA	AGCAUCAA	UUGAUGCUA	UUUAUGCA
	5751	CUUGCAUA	CUGAUGA	X	GAA	AUAGCAUC	GAUGCUAUU	UAUGCAAG

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	5752	ACUUGCAU	CUGAUGA	X	GAA	AAUAGCAU	AUGCUAUUU	AUGCAAGU
	5753	AACUUGCA	CUGAUGA	X	GAA	AAAUAGCA	UGCUAUUUA	UGCAAGUU
	5761	UAGACCCU	CUGAUGA	X	GAA	ACUUGCAU	AUGCAAGUU	AGGGUCUA
	5762	AUAGACCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUA	GGGUCUAU
5	5767	AAUACAUA	CUGAUGA	X	GAA	ACCCUAAC	GUUAGGGUC	UAUGUAUU
	5769	UAAAUACA	CUGAUGA	X	GAA	AGACCCUA	UAGGGUCUA	UGUAUUUA
	5773	AUCCUAAA	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUA	UUUAGGAU
	5775	GCAUCCUA	CUGAUGA	X	GAA	AUACAUAU	CUAUGUAUU	UAGGAUGC
	5776	CGCAUCCU	CUGAUGA	X	GAA	AAUACAUA	UAUGUAUUU	AGGAUGCG
10	5777	GCGCAUCC	CUGAUGA	X	GAA	AAAUACAUA	AUGUAUUUA	GGAUGCGC
	5788	CUGAAGAG	CUGAUGA	X	GAA	AGGCGCAU	AUGCGCCUA	CUCUUCAG
	5791	ACCCUGAA	CUGAUGA	X	GAA	AGUAGGCG	CGCCUACUC	UUCAGGGU
	5793	AGACCCUG	CUGAUGA	X	GAA	AGAGUAGG	CCUACUCUU	CAGGGUCU
	5794	UAGACCCU	CUGAUGA	X	GAA	AAGAGUAG	CUACUCUUC	AGGGUCUA
15	5800	GAUCUUUA	CUGAUGA	X	GAA	ACCCUGAA	UUCAGGGUC	UAAAGAUC
	5802	UUGAUCUU	CUGAUGA	X	GAA	AGACCCUG	CAGGGUCUA	AAGAUCAA
	5808	GCCCACUU	CUGAUGA	X	GAA	AUCUUUAG	CUAAAGAUC	AAGUGGGC
	5819	AGCGAUCC	CUGAUGA	X	GAA	AGGCCCAC	GUGGGCCUU	GGAUCGCU
	5824	AGCUUAGC	CUGAUGA	X	GAA	AUCCAAGG	CCUUGGAUC	GCUAAGCU
20	5828	AGCCAGCU	CUGAUGA	X	GAA	AGCGAUCC	GGAUCGCUA	AGCUGGCU
	5837	AUCAAACA	CUGAUGA	X	GAA	AGCCAGCU	AGCUGGCUC	UGUUUGAU
	5841	UAGCAUCA	CUGAUGA	X	GAA	ACAGAGCC	GGCUCUGUU	UGAUGCUA
	5842	AUAGCAUC	CUGAUGA	X	GAA	AACAGAGC	GCUCUGUUU	GAUGCUAU
	5849	UGCAUAAA	CUGAUGA	X	GAA	AGCAUCAA	UUGAUGCUA	UUUAUGCA
25	5851	CUUGCAUA	CUGAUGA	X	GAA	AUAGCAUC	GAUGCUAUU	UAUGCAAG
	5852	ACUUGCAU	CUGAUGA	X	GAA	AAUAGCAU	AUGCUAUUU	AUGCAAGU
	5853	AACUUGCA	CUGAUGA	X	GAA	AAAUAGCA	UGCUAUUUA	UGCAAGUU
	5861	UAGACCCU	CUGAUGA	X	GAA	ACUUGCAU	AUGCAAGUU	AGGGUCUA
	5862	AUAGACCC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUA	GGGUCUAU
30	5867	AAUACAUA	CUGAUGA	X	GAA	ACCCUAAC	GUUAGGGUC	UAUGUAUU
	5869	UAAAUACA	CUGAUGA	X	GAA	AGACCCUA	UAGGGUCUA	UGUAUUUA
	5873	AUCCUAAA	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUA	UUUAGGAU
	5875	ACAUCCUA	CUGAUGA	X	GAA	AUACAUAU	CUAUGUAUU	UAGGAUGC

	5876	GACAUCCU	CUGAUGA	X	GAA	AAUACAU	UAUGUAUUU	AGGAUGUC
	5877	AGACAUCC	CUGAUGA	X	GAA	AAAUACAU	AUGUAUUUA	GGAUGUCU
	5884	AAGGUGCA	CUGAUGA	X	GAA	ACAUCCUA	UAGGAUGUC	UGCACCUU
	5892	GGCUGCAG	CUGAUGA	X	GAA	AGGUGCAG	CUGCACCUU	CUGCAGCC
5	5893	UGGCUGCA	CUGAUGA	X	GAA	AAGGUGCA	UGCACCUUC	UGCAGCCA
	5904	CAGCUUCU	CUGAUGA	X	GAA	ACUGGCUG	CAGCCAGUC	AGAAGCUG
	5930	GAAGCAGC	CUGAUGA	X	GAA	AUCCACUG	CAGUGGAUU	GCUGCUUC
	5937	UCCCCAAG	CUGAUGA	X	GAA	AGCAGCAA	UUGCUGCUU	CUUGGGGA
	5938	CUCCCCAA	CUGAUGA	X	GAA	AAGCAGCA	UGCUGCUUC	UUGGGGAG
10	5940	UUCUCCCC	CUGAUGA	X	GAA	AGAAGCAG	CUGCUUCUU	GGGGAGAA
	5953	AGGAAGCA	CUGAUGA	X	GAA	ACUCUUCU	AGAAGAGUA	UGC UCCU
	5958	AUAAAAGG	CUGAUGA	X	GAA	AGCAUACU	AGUAUGCUU	CCUUUUUAU
	5959	GAUAAAAG	CUGAUGA	X	GAA	AAGCAUAC	GUAUGCUUC	CUUUUAUC
	5962	AUGGAUAA	CUGAUGA	X	GAA	AGGAAGCA	UGC UCCU	UUAUCCAU
15	5963	CAUGGAUA	CUGAUGA	X	GAA	AAGGAAGC	GCUUCCUUU	UAUCCAUG
	5964	ACAUGGAU	CUGAUGA	X	GAA	AAAGGAAG	CUUCCUUUU	AUCCAUGU
	5965	UACAUGGA	CUGAUGA	X	GAA	AAAAGGAA	UUCCUUUUA	UCCAUGUA
	5967	AUUACAUG	CUGAUGA	X	GAA	AUAAAAGG	CCUUUUUUC	CAUGUAAU
	5973	AGUUAAAU	CUGAUGA	X	GAA	ACAUGGAU	AUCCAUGUA	AUUUAACU
20	5976	UACAGUUA	CUGAUGA	X	GAA	AUUACAUG	CAUGUAAUU	UAACUGUA
	5977	CUACAGUU	CUGAUGA	X	GAA	AAUUACAU	AUGUAAUUU	AACUGUAG
	5978	UCUACAGU	CUGAUGA	X	GAA	AAAUACAU	UGUAAUUUA	ACUGUAGA
	5984	UCAGGUUC	CUGAUGA	X	GAA	ACAGUUAA	UUAACUGUA	GAACCUGA
	5996	GUUACUUA	CUGAUGA	X	GAA	AGCUCAGG	CCUGAGCUC	UAAGUAAC
25	5998	CGGUUACU	CUGAUGA	X	GAA	AGAGCUCA	UGAGCUCUA	AGUAACCG
	6002	UCUUCGGU	CUGAUGA	X	GAA	ACUUAGAG	CUCUAAGUA	ACCGAAGA
	6015	CAGAGGCA	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	UGCCUCUG
	6021	UAAGAACA	CUGAUGA	X	GAA	AGGCAUAC	GUAUGCCUC	UGUUCUUA
	6025	CACAUAA	CUGAUGA	X	GAA	ACAGAGGC	GCCUCUGUU	CUUAUGUG
30	6026	GCACAUAA	CUGAUGA	X	GAA	AACAGAGG	CCUCUGUUC	UUAUGUGC
	6028	UGGCACAU	CUGAUGA	X	GAA	AGAACAGA	UCUGUUCUU	AUGUGCCA
	6029	GUGGCACA	CUGAUGA	X	GAA	AAGAACAG	CUGUUCUUA	UGUGCCAC
	6040	UAAACAAG	CUGAUGA	X	GAA	AUGUGGCA	UGCCACAUC	CUUGUUUA

	6043	CUUUAAAC	CUGAUGA	X	GAA	AGGAUGUG	CACAUCCUU	GUUUAAG
	6046	AGCCUUUA	CUGAUGA	X	GAA	ACAAGGAU	AUCCUUGUU	UAAAGGCU
	6047	GAGCCUUU	CUGAUGA	X	GAA	AACAAGGA	UCCUUGUUU	AAAGGCUC
	6048	AGAGCCUU	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUA	AAGGCUCU
5	6055	CAUACAGA	CUGAUGA	X	GAA	AGCCUUUA	UAAAGGCUC	UCUGUAUG
	6057	UUCAUACA	CUGAUGA	X	GAA	AGAGCCUU	AAGGCUCUC	UGUAUGAA
	6061	UCUCUUCA	CUGAUGA	X	GAA	ACAGAGAG	CUCUCUGUA	UGAAGAGA
	6079	GUGCUGAU	CUGAUGA	X	GAA	ACGGUCCC	GGGACCGUC	AUCAGCAC
	6082	AAUGUGCU	CUGAUGA	X	GAA	AUGACGGU	ACCGUCAUC	AGCACAUA
10	6090	CACUAGGG	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAUA	CCCUAGUG
	6091	UCACUAGG	CUGAUGA	X	GAA	AAUGUGCU	AGCACAUAU	CCUAGUGA
	6095	AGGCUCAC	CUGAUGA	X	GAA	AGGGAAUG	CAUUCCCUA	GUGAGCCU
	6104	GGAGCCAG	CUGAUGA	X	GAA	AGGCUCAC	GUGAGCCUA	CUGGCUCU
	6111	GCUGCCAG	CUGAUGA	X	GAA	AGCCAGUA	UACUGGCUC	CUGGCAGC
15	6124	UUCCACAA	CUGAUGA	X	GAA	AGCCGCUG	CAGCGGCUU	UUGUGGAA
	6125	CUUCCACA	CUGAUGA	X	GAA	AAGCCGCU	AGCGGCUUU	UGUGGAAG
	6126	UCUCCAC	CUGAUGA	X	GAA	AAAGCCGC	GCGGCUUUU	GUGGAAGA
	6137	UGGCUAGU	CUGAUGA	X	GAA	AGUCUUC	GGAAGACUC	ACUAGCCA
	6141	CUUCUGGC	CUGAUGA	X	GAA	AGUGAGUC	GACUCACUA	GCCAGAAG
20	6166	GUGGAGAG	CUGAUGA	X	GAA	ACUGUCCC	GGGACAGUC	CUCUCCAC
	6169	UUGGUGGA	CUGAUGA	X	GAA	AGGACUGU	ACAGUCCUC	UCCACCAA
	6171	UCUUGGUG	CUGAUGA	X	GAA	AGAGGACU	AGUCCUCUC	CACCAAGA
	6181	UGGAUUUA	CUGAUGA	X	GAA	AUCUUGGU	ACCAAGAUC	UAAAUCCA
	6183	UUUGGAUU	CUGAUGA	X	GAA	AGAUCUUG	CAAGAUCUA	AAUCCAAA
25	6187	UUUGUUUG	CUGAUGA	X	GAA	AUUUAGAU	AUCUAAAUC	CAAACAAA
	6204	UCUGGCUC	CUGAUGA	X	GAA	AGCCUGCU	AGCAGGCUA	GAGCCAGA
	6226	ACAACAAA	CUGAUGA	X	GAA	AUUUGUCC	GGACAAAUC	UUUGUUGU
	6228	GAACAACA	CUGAUGA	X	GAA	AGAUUUGU	ACAAAUCUU	UGUUGUUC
	6229	GGAACAAC	CUGAUGA	X	GAA	AAGAUUUG	CAAAUCUUU	GUUGUUCU
30	6232	AGAGGAAC	CUGAUGA	X	GAA	ACAAAGAU	AUCUUUGUU	GUUCCUCU
	6235	AGAAGAGG	CUGAUGA	X	GAA	ACAACAAA	UUUGUUGUU	CCUCUUCU
	6236	AAGAAGAG	CUGAUGA	X	GAA	AACAACAA	UUGUUGUUC	CUCUUCUU
	6239	GUAAAGAA	CUGAUGA	X	GAA	AGGAACAA	UUGUCCUC	UUCUUUAC

	6241	GUGUAAAAG	CUGAUGA	X	GAA	AGAGGAAC	GUUCCUCUU	CUUUACAC
	6242	UGUGUAAA	CUGAUGA	X	GAA	AAGAGGAA	UUCUCUCUC	UUUACACA
	6244	UAUGUGUA	CUGAUGA	X	GAA	AGAAGAGG	CCUCUUCUU	UACACAU
	6245	GUAUGUGU	CUGAUGA	X	GAA	AAGAAGAG	CUCUUCUUU	ACACAUAC
5	6246	CGUAUGUG	CUGAUGA	X	GAA	AAAGAAGA	UCUUCUUUA	CACAUACG
	6252	GGUUUGCG	CUGAUGA	X	GAA	AUGUGUAA	UUACACAU	CGCAAACC
	6280	AUUUAUAA	CUGAUGA	X	GAA	AUUGCCAG	CUGGCAAUU	UUUAUAAU
	6281	GAUUUAUA	CUGAUGA	X	GAA	AAUUGCCA	UGGCAAUUU	UAUAAAUC
	6282	UGAUUUUAU	CUGAUGA	X	GAA	AAAUUGCC	GGCAAUUUU	AUAAAUCA
10	6283	CUGAUUUA	CUGAUGA	X	GAA	AAAAUUGC	GCAAUUUUA	UAAAUCAG
	6285	ACCUGAUU	CUGAUGA	X	GAA	AUAAAAUU	AAUUUUUAU	AAUCAGGU
	6289	AGUUACCU	CUGAUGA	X	GAA	AUUUAUAA	UUUAUAAUC	AGGUAACU
	6294	CUUCCAGU	CUGAUGA	X	GAA	ACCUGAUU	AAUCAGGUA	ACUGGAAG
	6308	CUGAGUUU	CUGAUGA	X	GAA	ACCUCUUU	AAGGAGGUU	AAACUCAG
15	6309	UCUGAGUU	CUGAUGA	X	GAA	AACCUCUU	AGGAGGUUA	AACUCAGA
	6314	UUUUUUCU	CUGAUGA	X	GAA	AGUUUAAC	GUUAAACUC	AGAAAAAA
	6331	AAUUGACU	CUGAUGA	X	GAA	AGGUCUUC	GAAGACCUC	AGUCAAUU
	6335	AGAGAAUU	CUGAUGA	X	GAA	ACUGAGGU	ACCUCAGUC	AAUUCUCU
	6339	AAGUAGAG	CUGAUGA	X	GAA	AUUGACUG	CAGUCAAUU	CUCUACUU
20	6340	AAAGUAGA	CUGAUGA	X	GAA	AAUUGACU	AGUCAAUUC	UCUACUUU
	6342	AAAAAGUA	CUGAUGA	X	GAA	AGAAUUGA	UCAAUUCUC	UACUUUUU
	6344	AAAAAAAG	CUGAUGA	X	GAA	AGAGAAUU	AAUUCUCUA	CUUUUUUU
	6347	AAAAAAGAA	CUGAUGA	X	GAA	AGUAGAGA	UCUCUACUU	UUUUUUUU
	6348	AAAAAAGAA	CUGAUGA	X	GAA	AAGUAGAG	CUCUACUUU	UUUUUUUU
25	6349	AAAAAAGAA	CUGAUGA	X	GAA	AAAGUAGA	UCUACUUUU	UUUUUUUU
	6350	AAAAAAGAA	CUGAUGA	X	GAA	AAAAGUAG	CUACUUUUU	UUUUUUUU
	6351	AAAAAAGAA	CUGAUGA	X	GAA	AAAAAGUA	UACUUUUUU	UUUUUUUU
	6352	AAAAAAGAA	CUGAUGA	X	GAA	AAAAAGU	ACUUUUUUU	UUUUUUUU
	6353	AAAAAAGAA	CUGAUGA	X	GAA	AAAAAAG	CUUUUUUUU	UUUUUUUU
30	6354	GAAAAAAGAA	CUGAUGA	X	GAA	AAAAAAGAA	UUUUUUUUU	UUUUUUUC
	6355	GGAAAAAAGAA	CUGAUGA	X	GAA	AAAAAAGAA	UUUUUUUUU	UUUUUUCC
	6356	UGGAAAAAAGAA	CUGAUGA	X	GAA	AAAAAAGAA	UUUUUUUUU	UUUUUCCA
	6357	UUGGAAAAAAGAA	CUGAUGA	X	GAA	AAAAAAGAA	UUUUUUUUU	UUUUUCAA

6358	UUUGGAAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UUUCCAAA
6359	AUUUGGAA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UUCCAAAU
6360	GAUUUGGA	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	UCCAAAUC
6361	UGAUUUGG	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUU	CCAAAUCA
5 6362	CUGAUUUG	CUGAUGA	X	GAA	AAAAAAA	UUUUUUUUC	CAAUCAG
6368	UAUUAUCU	CUGAUGA	X	GAA	AUUUGGAA	UUCCAAAU	AGAUAAUA
6373	UGGGCUAU	CUGAUGA	X	GAA	AUCUGAUU	AAUCAGUA	AUAGCCCA
6376	UGCUGGGC	CUGAUGA	X	GAA	AUUAUCUG	CAGAUAAUA	GCCCAGCA
6388	GUUAUCAC	CUGAUGA	X	GAA	AUUUGCUG	CAGCAAUA	GUGAUAA
10 6394	UUAUUUGU	CUGAUGA	X	GAA	AUCACUAU	AUAGUGUA	ACAAAUAA
6401	UAAGGUUU	CUGAUGA	X	GAA	AUUUGUUA	UAACAAUA	AAACCUUA
6408	GAACAGCU	CUGAUGA	X	GAA	AGGUUUUA	UAAAACCUU	AGCUGUUC
6409	UGAACAGC	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUA	GCUGUUA
6415	AAGACAUG	CUGAUGA	X	GAA	ACAGCUAA	UUAGCUGUU	CAUGUCUU
15 6416	CAAGACAU	CUGAUGA	X	GAA	AACAGCUA	UAGCUGUUC	AUGUCUUG
6421	GAAAUCAA	CUGAUGA	X	GAA	ACAUGAAC	GUUCAUGUC	UUGAUUUC
6423	UUGAAAU	CUGAUGA	X	GAA	AGACAUGA	UCAUGUCUU	GAUUUCAA
6427	AUUAUUGA	CUGAUGA	X	GAA	AUCAAGAC	GUCUUGAUU	UCAAUAAU
6428	AAUUAUUG	CUGAUGA	X	GAA	AAUCAAGA	UCUUGAUUU	CAAUAAUU
20 6429	UAAUUAUU	CUGAUGA	X	GAA	AAAUCAAG	CUUGAUUUC	AAUAAUUA
6433	GAAUUAUU	CUGAUGA	X	GAA	AUUGAAAU	AUUUCAUA	AUUAAUUC
6436	UAAGAAUU	CUGAUGA	X	GAA	AUUAUUGA	UCAAUAAU	AAUUCUUA
6437	UUAAGAAU	CUGAUGA	X	GAA	AAUUAUUG	CAAUAAUUA	AUUCUUA
6440	UGAUUAAG	CUGAUGA	X	GAA	AUUAUUA	UAAUUAUU	CUUAAUCA
25 6441	AUGAUUAA	CUGAUGA	X	GAA	AAUUAUU	AAUUAUUC	UUAUUCAU
6443	UAAUGAUU	CUGAUGA	X	GAA	AGAAUUA	UUAUUUCUU	AAUCAUUA
6444	UUAUGAU	CUGAUGA	X	GAA	AAGAAUUA	UAAUUCUUA	AUCAUUA
6447	CUCUUAUU	CUGAUGA	X	GAA	AUUAAGAA	UUCUUAUUC	AUUAAGAG
6450	GGUCUCUU	CUGAUGA	X	GAA	AUGAUUAA	UUAUUCAUU	AAGAGACC
30 6451	UGGUCUCU	CUGAUGA	X	GAA	AAUGAUUA	UAAUCAUUA	AGAGACCA
6461	GUAUUUAU	CUGAUGA	X	GAA	AUGGUCUC	GAGACCAUA	AUAAAUAC
6464	GGAGUAUU	CUGAUGA	X	GAA	AUUAUGGU	ACCAUAAUA	AAUACUCC
6468	AAAAGGAG	CUGAUGA	X	GAA	AUUAUUA	UAAUAAUA	CUCCUUUU

6471	UUGAAAAG	CUGAUGA	X	GAA	AGUAUUUA	UAAAUACUC	CUUUUCAA
6474	CUCUUGAA	CUGAUGA	X	GAA	AGGAGUAU	AUACUCCUU	UUCAAGAG
6475	UCUCUUGA	CUGAUGA	X	GAA	AAGGAGUA	UACUCCUUU	UCAAGAGA
6476	UUCUCUUG	CUGAUGA	X	GAA	AAAGGAGU	ACUCCUUUU	CAAGAGAA
5 6477	UUUCUCUU	CUGAUGA	X	GAA	AAAAGGAG	CUCCUUUUC	AAGAGAAA
6497	ACAAUUCU	CUGAUGA	X	GAA	AUGGUUUU	AAAACCAUU	AGAAUUGU
6498	AACAAUUC	CUGAUGA	X	GAA	AAUGGUUU	AAACCAUUA	GAAUUGUU
6503	UGAGUAAC	CUGAUGA	X	GAA	AUUCUAAU	AUUAGAAUU	GUUACUCA
6506	AGCUGAGU	CUGAUGA	X	GAA	ACAAUUCU	AGAAUUGUU	ACUCAGCU
10 6507	GAGCUGAG	CUGAUGA	X	GAA	AACAAUUC	GAAUUGUUA	CUCAGCUC
6510	AAGGAGCU	CUGAUGA	X	GAA	AGUAACAA	UUGUUACUC	AGCUCCUU
6515	GUUUGAAG	CUGAUGA	X	GAA	AGCUGAGU	ACUCAGCUC	CUUCAAAC
6518	UGAGUUUG	CUGAUGA	X	GAA	AGGAGCUG	CAGCUCCUU	CAAACUCA
6519	CUGAGUUU	CUGAUGA	X	GAA	AAGGAGCU	AGCUCCUUC	AAACUCAG
15 6525	ACAAACCU	CUGAUGA	X	GAA	AGUUUGAA	UUCAAACUC	AGGUUUGU
6530	AUGCUACA	CUGAUGA	X	GAA	ACCUGAGU	ACUCAGGUU	UGUAGCAU
6531	UAUGCUC	CUGAUGA	X	GAA	AACCUGAG	CUCAGGUUU	GUAGCAUA
6534	AUGUAUGC	CUGAUGA	X	GAA	ACAAACCU	AGGUUUGUA	GCAUACAU
6539	GACUCAUG	CUGAUGA	X	GAA	AUGCUACA	UGUAGCAUA	CAUGAGUC
20 6547	GAUGGAUG	CUGAUGA	X	GAA	ACUCAUGU	ACAUGAGUC	CAUCCAUC
6551	GACUGAUG	CUGAUGA	X	GAA	AUGGACUC	GAGUCCAUC	CAUCAGUC
6555	CUUUGACU	CUGAUGA	X	GAA	AUGGAUGG	CCAUCCAUC	AGUCAAAAG
6559	CAUUCUUU	CUGAUGA	X	GAA	ACUGAUGG	CCAUCAGUC	AAAGAAUG
6570	CCAGAUGG	CUGAUGA	X	GAA	ACCAUUCU	AGAAUGGUU	CCAUCUGG
25 6571	UCCAGAUG	CUGAUGA	X	GAA	AACCAUUC	GAAUGGUUC	CAUCUGGA
6575	AGACUCCA	CUGAUGA	X	GAA	AUGGAACC	GGUCCAUC	UGGAGUCU
6582	UACAUUAA	CUGAUGA	X	GAA	ACUCCAGA	UCUGGAGUC	UUAAUGUA
6584	UCUACAUU	CUGAUGA	X	GAA	AGACUCCA	UGGAGUCUU	AAUGUAGA
6585	UUCUACAU	CUGAUGA	X	GAA	AAGACUCC	GGAGUCUUA	AUGUAGAA
30 6590	UUUCUUUC	CUGAUGA	X	GAA	ACAUUAAG	CUUAAUGUA	GAAAGAAA
6609	AUUAUUAC	CUGAUGA	X	GAA	AGUCUCCA	UGGAGACUU	GUAAUAAU
6612	CUCAUUAU	CUGAUGA	X	GAA	ACAAGUCU	AGACUUGUA	AUAAUGAG
6615	UAGCUCAU	CUGAUGA	X	GAA	AUUACAAG	CUUGUAAUA	AUGAGCUA

	6623	UUUGUAAC	CUGAUGA	X	GAA	AGCUCAUU	AAUGAGCUA	GUUACAAA
	6626	CACUUUGU	CUGAUGA	X	GAA	ACUAGCUC	GAGCUAGUU	ACAAAGUG
	6627	GCACUUUG	CUGAUGA	X	GAA	AACUAGCU	AGCUAGUUA	CAAAGUGC
	6637	UAAUGAAC	CUGAUGA	X	GAA	AGCACUUU	AAAGUGCUU	GUUCAUUA
5	6640	UUUUAAUG	CUGAUGA	X	GAA	ACAAGCAC	GUGCUUGUU	CAUUAAAA
	6641	AUUUUAAU	CUGAUGA	X	GAA	AACAAGCA	UGCUUGUUC	AUUAAAAU
	6644	GCUAUUUU	CUGAUGA	X	GAA	AUGAACAA	UUGUUCAUU	AAAAUAGC
	6645	UGCUAUUU	CUGAUGA	X	GAA	AAUGAACA	UGUUCAUUA	AAAUAGCA
	6650	UUCAGUGC	CUGAUGA	X	GAA	AUUUUAAU	AUUAAAAUA	GCACUGAA
10	6662	CAUGUUUC	CUGAUGA	X	GAA	AUUUUCAG	CUGAAAAUU	GAAACAUG
	6674	UAUCAGUU	CUGAUGA	X	GAA	AUUCAUGU	ACAUGAAUU	AACUGAUA
	6675	UUAUCAGU	CUGAUGA	X	GAA	AAUUCAUG	CAUGAAUUA	ACUGAUAA
	6682	UGGAAUAU	CUGAUGA	X	GAA	AUCAGUUA	UAAUCGAUA	AUAUCCAA
	6685	GAUUGGAA	CUGAUGA	X	GAA	AUUAUCAG	CUGAUAAUA	UUCCAAUC
15	6687	AUGAUUGG	CUGAUGA	X	GAA	AUAUUAUC	GAUAAUAUU	CCAAUCAU
	6688	AAUGAUUG	CUGAUGA	X	GAA	AAUAUUAU	AUAAUAUUC	CAAUCAUU
	6693	UGGCAAAU	CUGAUGA	X	GAA	AUUGGAAU	AUUCCAAUC	AUUUGCCA
	6696	AAAUGGCA	CUGAUGA	X	GAA	AUGAUUGG	CCAAUCAUU	UGCCAUUU
	6697	UAAAUGGC	CUGAUGA	X	GAA	AAUGAUUG	CAAUCAUUU	GCCAUUUA
20	6703	UUGUCAUA	CUGAUGA	X	GAA	AUGGCAAA	UUUGCCAUU	UAUGACAA
	6704	UUUGUCAU	CUGAUGA	X	GAA	AAUGGCAA	UUGCCAUUU	AUGACAAA
	6705	UUUUGUCA	CUGAUGA	X	GAA	AAAUGGCA	UGCCAUUUA	UGACAAAA
	6719	UUAGUGCC	CUGAUGA	X	GAA	ACCAUUUU	AAAAUGGUU	GGCACUAA
	6726	UUCUUUGU	CUGAUGA	X	GAA	AGUGCCAA	UUGGCACUA	ACAAAGAA
25	6743	CUGAAAGG	CUGAUGA	X	GAA	AGUGCUCG	CGAGCACUU	CCUUUCAG
	6744	UCUGAAAG	CUGAUGA	X	GAA	AAGUGCUC	GAGCACUUC	CUUUCAGA
	6747	AACUCUGA	CUGAUGA	X	GAA	AGGAAGUG	CACUCCUUU	UCAGAGUU
	6748	AAACUCUG	CUGAUGA	X	GAA	AAGGAAGU	ACUCCUUUU	CAGAGUUU
	6749	GAAACUCU	CUGAUGA	X	GAA	AAAGGAAG	CUUCCUUUC	AGAGUUUC
30	6755	AUCUCAGA	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU	UCUGAGAU
	6756	UAUCUCAG	CUGAUGA	X	GAA	AACUCUGA	UCAGAGUUU	CUGAGAUU
	6757	UUAUCUCA	CUGAUGA	X	GAA	AAACUCUG	CAGAGUUUC	UGAGAUAA
	6764	ACGUACAU	CUGAUGA	X	GAA	AUCUCAGA	UCUGAGAUU	AUGUACGU



	6769	GUUCCACG	CUGAUGA	X	GAA	ACAUUAUC	GAUAAUGUA	CGUGGAAC
	6781	UCCACCCA	CUGAUGA	X	GAA	ACUGUUC	GGAACAGUC	UGGGUGGA
	6814	AAGACACA	CUGAUGA	X	GAA	ACUUGCAC	GUGCAAGUC	UGUGUCUU
	6820	ACUGACAA	CUGAUGA	X	GAA	ACACAGAC	GUCUGUGUC	UUGUCAGU
5	6822	GGACUGAC	CUGAUGA	X	GAA	AGACACAG	CUGUGUCUU	GUCAGUCC
	6825	CUUGGACU	CUGAUGA	X	GAA	ACAAGACA	UGUCUUGUC	AGUCCAAG
	6829	ACUUCUUG	CUGAUGA	X	GAA	ACUGACAA	UUGUCAGUC	CAAGAAGU
	6851	CUAAAAUU	CUGAUGA	X	GAA	ACAUCUCG	CGAGAUGUU	AAUUUUAG
	6852	CCUAAAAU	CUGAUGA	X	GAA	AACAUCUC	GAGAUGUUA	AUUUUAGG
10	6855	GUCCCUAA	CUGAUGA	X	GAA	AUUAACAU	AUGUUAUU	UUAGGGAC
	6856	GGUCCCUA	CUGAUGA	X	GAA	AAUUAACA	UGUUAUUU	UAGGGACC
	6857	GGGUCCCU	CUGAUGA	X	GAA	AAAUUAAC	GUUAAUUU	AGGGACCC
	6858	CGGUCCCC	CUGAUGA	X	GAA	AAAAUUA	UUAAUUUU	GGGACCCG
	6872	UAGGAAAC	CUGAUGA	X	GAA	AGGCACGG	CCGUGCCUU	GUUCCUA
15	6875	GGCUAGGA	CUGAUGA	X	GAA	ACAAGGCA	UGCCUUGUU	UCCUAGCC
	6876	GGGCUAGG	CUGAUGA	X	GAA	AACAAGGC	GCCUUGUUU	CCUAGCCC
	6877	UGGGCUAG	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUC	CUAGCCCA
	6880	UUGUGGGC	CUGAUGA	X	GAA	AGGAAACA	UGUUUCCUA	GCCCACAA
	6901	AUCUGUUU	CUGAUGA	X	GAA	AUGUUUGC	GCAAACAUC	AAACAGAU
20	6910	CUAGCGAG	CUGAUGA	X	GAA	AUCUGUUU	AAACAGAU	CUCGCUAG
	6913	AGGCUAGC	CUGAUGA	X	GAA	AGUAUCUG	CAGAUACUC	GCUAGCCU
	6917	AAUGAGGC	CUGAUGA	X	GAA	AGCGAGUA	UACUCGCUA	GCCUCAUU
	6922	AUUUAAAU	CUGAUGA	X	GAA	AGGCUAGC	GCUAGCCUC	AUUUAAAU
	6925	UCAAUUUA	CUGAUGA	X	GAA	AUGAGGCU	AGCCUCAUU	UAAAUUGA
25	6926	AUCAAUUU	CUGAUGA	X	GAA	AAUGAGGC	GCCUCAUUU	AAAUUGAU
	6927	AAUCAAUU	CUGAUGA	X	GAA	AAAUGAGG	CCUCAUUUA	AAUUGAUU
	6931	CUUUAAUC	CUGAUGA	X	GAA	AUUUAAAU	AUUUAAAU	GAUUAAAG
	6935	CCUCCUUU	CUGAUGA	X	GAA	AUCAAUUU	AAAUUGAUU	AAAGGAGG
	6936	UCCUCCUU	CUGAUGA	X	GAA	AAUCAAUU	AAUUGAUUA	AAGGAGGA
30	6951	CGGCCAAA	CUGAUGA	X	GAA	AUGCACUC	GAGUGCAUC	UUUGGCCG
	6953	GUCGGCCA	CUGAUGA	X	GAA	AGAUGCAC	GUGCAUCUU	UGGCCGAC
	6954	UGUCGGCC	CUGAUGA	X	GAA	AAGAUGCA	UGCAUCUUU	GGCCGACA
	6970	CACACAGU	CUGAUGA	X	GAA	ACACCACU	AGUGGUGUA	ACUGUGUG

	7026	AACACACA	CUGAUGA	X	GAA	ACACCCAC	GUGGGUGUA	UGUGUGUU
	7034	AUGCACAA	CUGAUGA	X	GAA	ACACACAU	AUGUGUGUU	UUGUGCAU
	7035	UAUGCACA	CUGAUGA	X	GAA	AACACACA	UGUGUGUUU	UGUGCAUA
	7036	UUAUGCAC	CUGAUGA	X	GAA	AAACACAC	GUGUGUUUU	GUGCAUAA
5	7043	UAAAUAGU	CUGAUGA	X	GAA	AUGCACAA	UUGUGCAUA	ACUAUUUA
	7047	UCCUUAAA	CUGAUGA	X	GAA	AGUUAUGC	GCAUAACUA	UUUAAGGA
	7049	UUUCCUUA	CUGAUGA	X	GAA	AUAGUUUA	AUAACUAUU	UAAGGAAA
	7050	GUUCCUUA	CUGAUGA	X	GAA	AAUAGUUA	UAACUAUUU	AAGGAAAC
	7051	AGUUUCCU	CUGAUGA	X	GAA	AAUAGUU	AACUAUUUA	AGGAAACU
10	7065	AACUUUAA	CUGAUGA	X	GAA	AUUCAGU	ACUGGAAUU	UUAAAGUU
	7066	UACUUUUA	CUGAUGA	X	GAA	AAUCCAG	CUGGAAUUU	UAAAGUUA
	7067	GUAACUUU	CUGAUGA	X	GAA	AAAUCCA	UGGAAUUUU	AAAGUUAC
	7068	AGUAACUU	CUGAUGA	X	GAA	AAAUUCC	GGAAUUUUA	AAGUUACU
	7073	AUAAAAGU	CUGAUGA	X	GAA	ACUUUAAA	UUUAAAGUU	ACUUUUUA
15	7074	UAUAAAAG	CUGAUGA	X	GAA	AACUUUAA	UUAAAGUUA	CUUUUAUA
	7077	UUGUAUAA	CUGAUGA	X	GAA	AGUAACUU	AAGUUACUU	UUUAACAA
	7078	UUUGUAUA	CUGAUGA	X	GAA	AAGUAACU	AGUUACUUU	UAUACAAA
	7079	GUUUGUAU	CUGAUGA	X	GAA	AAAGUAAC	GUUACUUUU	AUACAAAC
	7080	GGUUUGUA	CUGAUGA	X	GAA	AAAAGUAA	UUACUUUUA	UACAAACC
20	7082	UUGGUUUG	CUGAUGA	X	GAA	AUAAAAGU	ACUUUUUAU	CAAACCAA
	7095	GUAGCAUA	CUGAUGA	X	GAA	AUUCUUGG	CCAAGAAUA	UAUGCUCAC
	7097	CUGUAGCA	CUGAUGA	X	GAA	AUAUUCUU	AAGAAUAUA	UGCUCACAG
	7102	UAUAUCUG	CUGAUGA	X	GAA	AGCAUAUA	UAUAUGCUA	CAGAUUAU
	7108	CUGUCUUA	CUGAUGA	X	GAA	AUCUGUAG	CUACAGAUUA	UAAGACAG
25	7110	GUCUGUCU	CUGAUGA	X	GAA	AUAUCUGU	ACAGAUUAU	AGACAGAC
	7124	UAGGACCA	CUGAUGA	X	GAA	ACCAUGUC	GACAUGGUU	UGGUCCUA
	7125	AUAGGACC	CUGAUGA	X	GAA	AACCAUGU	ACAUGGUUU	GGUCCUAU
	7129	AAAUUAUAG	CUGAUGA	X	GAA	ACCAAACC	GGUUUGGUC	CUAUUUUU
	7132	UAGAAUAU	CUGAUGA	X	GAA	AGGACCAA	UUGGUCCUA	UAUUUCUA
30	7134	ACUAGAAA	CUGAUGA	X	GAA	AUAGGACC	GGUCCUAUA	UUUCUAGU
	7136	UGACUAGA	CUGAUGA	X	GAA	AUAUAGGA	UCCUAUAUU	UCUAGUCA
	7137	AUGACUAG	CUGAUGA	X	GAA	AAUAUAGG	CCUAUAUUU	CUAGUCAU
	7138	CAUGACUA	CUGAUGA	X	GAA	AAUAUAG	CUAUUUUUC	UAGUCAUG

	7140	AUCAUGAC	CUGAUGA	X	GAA	AGAAAUAU	AUAUUUCUA	GUCAUGAU
	7143	UUCAUCAU	CUGAUGA	X	GAA	ACUAGAAA	UUUCUAGUC	AUGAUGAA
	7155	AUACAAAA	CUGAUGA	X	GAA	ACAUUCAU	AUGAAUGUA	UUUUGUUAU
	7157	GUUAACAA	CUGAUGA	X	GAA	AUACAUUC	GAAUGUAUU	UGUAUAC
5	7158	GGUAUACA	CUGAUGA	X	GAA	AAUACAUI	AAUGUAUUU	UGUAUACC
	7159	UGGUUAUAC	CUGAUGA	X	GAA	AAAUACAUI	AUGUAUUUU	GUUAUACCA
	7162	AGAUGGUA	CUGAUGA	X	GAA	ACAAAAUA	UAUUUUGUA	UACCAUCU
	7164	GAAGAUGG	CUGAUGA	X	GAA	AUACAAAA	UUUUGUAUA	CCAUCUUC
	7169	UAUAUGAA	CUGAUGA	X	GAA	AUGGUUAUA	UAUACCAUC	UUCAUUA
10	7171	AUUUAUUG	CUGAUGA	X	GAA	AGAUGGUA	UACCAUCUU	CAUAUAAU
	7172	UAUUUAU	CUGAUGA	X	GAA	AAGAUGGU	ACCAUCUUC	AUAUAAUA
	7175	GUUAUUA	CUGAUGA	X	GAA	AUGAAGAU	AUCUUCAUA	UAUAUAC
	7177	AAGUAUUA	CUGAUGA	X	GAA	AUAUGAAG	CUUCAUUA	AUAUACUU
	7180	UUUAAGUA	CUGAUGA	X	GAA	AUUUAUUG	CAUAUAAUA	UACUUAUA
15	7182	UUUUUAAG	CUGAUGA	X	GAA	AUAUUUAUA	UAUAUUAUA	CUUAAAAA
	7185	AUAUUUUU	CUGAUGA	X	GAA	AGUAUUAU	AAUAUACUU	AAAAUAU
	7186	AAUAUUUU	CUGAUGA	X	GAA	AAGUAUUA	AUAUACUUA	AAAAUAU
	7192	UUAAGAAA	CUGAUGA	X	GAA	AUUUUUAA	UUAAAAUA	UUUCUUA
	7194	AAUUAAGA	CUGAUGA	X	GAA	AUAUUUUU	AAAAUAU	UCUUAUU
20	7195	CAAUUAAG	CUGAUGA	X	GAA	AAUAUUUU	AAAAUAU	CUUAAUUG
	7196	CCAAUUA	CUGAUGA	X	GAA	AAUAUUUU	AAUAUUUC	UUAAUUGG
	7198	UCCCAAU	CUGAUGA	X	GAA	AGAAUAU	AUAUUUCUU	AAUUGGGA
	7199	AUCCCAAU	CUGAUGA	X	GAA	AAGAAUA	UAUUUCUUA	AUUGGGAU
	7202	CAAUCCC	CUGAUGA	X	GAA	AUUAAGAA	UUCUUAUU	GGGAUUUG
25	7208	CGAUUACA	CUGAUGA	X	GAA	AUCCCAAU	AUUGGGAU	UGUAUUCG
	7209	ACGAUUAC	CUGAUGA	X	GAA	AAUCCCAA	UUGGGAUUU	GUAAUCGU
	7212	GGUACGAU	CUGAUGA	X	GAA	ACAAAUCC	GGAUUUGUA	AUCGUACC
	7215	GUUGGUAC	CUGAUGA	X	GAA	AUUACAAA	UUUGUAAUC	GUACCAAC
	7218	UAAGUUGG	CUGAUGA	X	GAA	ACGAUUAC	GUAAUCGUA	CCAACUUA
30	7225	UAUCAAUU	CUGAUGA	X	GAA	AGUUGGUA	UACCAACUU	AAUUGAUA
	7226	UUUCAAU	CUGAUGA	X	GAA	AAGUUGGU	ACCAACUUA	AUUGAUAA
	7229	AGUUUAUC	CUGAUGA	X	GAA	AUUAAGUU	AACUUAUU	GAUAAACU
	7233	GCCAAGUU	CUGAUGA	X	GAA	AUCAAUUA	UAAUUGAUA	AACUUGGC

	7238	CAGUUGCC	CUGAUGA	X	GAA	AGUUUAUC	GAUAAACUU	GGCAACUG
	7249	GAACAUAA	CUGAUGA	X	GAA	AGCAGUUG	CAACUGCUU	UUAUGUUC
	7250	AGAACAUA	CUGAUGA	X	GAA	AAGCAGUU	AACUGCUUU	UAUGUUCU
	7251	CAGAACAU	CUGAUGA	X	GAA	AAAGCAGU	ACUGCUUUU	AUGUUCUG
5	7252	ACAGAACA	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUA	UGUUCUGU
	7256	GGAGACAG	CUGAUGA	X	GAA	ACAUAAAA	UUUUAUGUU	CUGUCUCC
	7257	AGGAGACA	CUGAUGA	X	GAA	AACAUAAA	UUUAUGUUC	UGUCUCCU
	7261	UGGAAGGA	CUGAUGA	X	GAA	ACAGAACA	UGUUCUGUC	UCCUCCA
	7263	UAUGGAAG	CUGAUGA	X	GAA	AGACAGAA	UUCUGUCUC	CUUCCAUA
10	7266	AUUUAUGG	CUGAUGA	X	GAA	AGGAGACA	UGUCUCCUU	CCAUAAAAU
	7267	AAUUUAUG	CUGAUGA	X	GAA	AAGGAGAC	GUCUCCUUC	CAUAAAUU
	7271	GAAAAAUU	CUGAUGA	X	GAA	AUGGAAGG	CCUCCAUA	AAUUUUUC
	7275	UUUUGAAA	CUGAUGA	X	GAA	AUUUAUGG	CCAUAAAUU	UUUCAAAA
	7276	AUUUUGAA	CUGAUGA	X	GAA	AAUUUAUG	CAUAAAUUU	UUCAAAAU
15	7277	UAUUUUGA	CUGAUGA	X	GAA	AAAUUUAU	AUAAAUUUU	UCAAAAUA
	7278	GUAUUUUG	CUGAUGA	X	GAA	AAAAUUUA	UAAAUUUUU	CAAAAUAC
	7279	AGUAUUUU	CUGAUGA	X	GAA	AAAAAUUU	AAAUUUUUC	AAAAUACU
	7285	UGAAUUAG	CUGAUGA	X	GAA	AUUUUGAA	UUCAAAAUA	CUAAUUCA
	7288	UGUUGAAU	CUGAUGA	X	GAA	AGUAUUUU	AAAAUACUA	AUUCACAA
20	7291	CUUUGUUG	CUGAUGA	X	GAA	AUUAGUAU	AUACUAAUU	CAACAAAG
	7292	UCUUUGUU	CUGAUGA	X	GAA	AAUUAGUA	UACUAAUUC	AACAAAGA
	7308	AAAAA AAA	CUGAUGA	X	GAA	AGCUUUUU	AAAAGCUC	UUUUUUUU
	7310	GGAAAAAA	CUGAUGA	X	GAA	AGAGCUUU	AAAGCUCUU	UUUUUCC
	7311	AGGAAAAA	CUGAUGA	X	GAA	AAGAGCUU	AAGCUCUUU	UUUUUCCU
25	7312	UAGGAAAA	CUGAUGA	X	GAA	AAAGAGCU	AGCUCUUUU	UUUCCUA
	7313	UUAGGAAA	CUGAUGA	X	GAA	AAAAGAGC	GCUCUUUUU	UUUCCUAA
	7314	UUUAGGAA	CUGAUGA	X	GAA	AAAAAGAG	CUCUUUUUU	UUCCUAAA
	7315	UUUUAGGA	CUGAUGA	X	GAA	AAAAAAGA	UCUUUUUUU	UCCUAAAA
	7316	AUUUUAGG	CUGAUGA	X	GAA	AAAAAAAG	CUUUUUUUU	CCUAAAAU
30	7317	UAUUUUAG	CUGAUGA	X	GAA	AAAAA AAA	UUUUUUUUC	CUAAAAUA
	7320	GUUUUAUU	CUGAUGA	X	GAA	AGGAAAAA	UUUUUCCUA	AAAUAAAC
	7325	UUUGAGUU	CUGAUGA	X	GAA	AUUUUAGG	CCUAAAAUA	AACUCAAA
	7330	AUAAAUUU	CUGAUGA	X	GAA	AGUUUAUU	AAUAAACUC	AAAUUUAU

	7335	CAAGGAUA	CUGAUGA	X	GAA	AUUUGAGU	ACUCAAAUU	UAUCCUUG
	7336	ACAAGGAU	CUGAUGA	X	GAA	AAUUUGAG	CUCAAAUUU	AUCCUUGU
	7337	AACAAGGA	CUGAUGA	X	GAA	AAAUUUGA	UCAAAUUUA	UCCUUGUU
	7339	UAAACAAG	CUGAUGA	X	GAA	AUAAAUUU	AAAUUUUUC	CUUGUUUA
5	7342	CUCUAAAC	CUGAUGA	X	GAA	AGGAUAAA	UUUAUCCUU	GUUUAGAG
	7345	CUGCUCUA	CUGAUGA	X	GAA	ACAAGGAU	AUCCUUGUU	UAGAGCAG
	7346	UCUGCUCU	CUGAUGA	X	GAA	AACAAGGA	UCCUUGUUU	AGAGCAGA
	7347	CUCUGCUC	CUGAUGA	X	GAA	AAACAAGG	CCUUGUUUA	GAGCAGAG
	7362	UUUUUCUU	CUGAUGA	X	GAA	AUUUUUCU	AGAAAAUUU	AAGAAAAA
10	7363	GUUUUUCU	CUGAUGA	X	GAA	AAUUUUUC	GAAAAUUUA	AGAAAAAC
	7373	CCAUUUCA	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUU	UGAAAUUG
	7374	ACCAUUUC	CUGAUGA	X	GAA	AAGUUUUU	AAAAACUUU	GAAAUUGU
	7383	UUUUUUGA	CUGAUGA	X	GAA	ACCAUUUC	GAAAUUGUC	UCAAAAAA
	7385	AAUUUUUU	CUGAUGA	X	GAA	AGACCAUU	AAUGGUCUC	AAAAAAUU
15	7393	UAUUUAGC	CUGAUGA	X	GAA	AUUUUUUG	CAAAAAUUU	GCUAAAUA
	7397	AAAAUAUU	CUGAUGA	X	GAA	AGCAAUUU	AAAUUGCUA	AAUAUUUU
	7401	AUUGAAAA	CUGAUGA	X	GAA	AUUUAGCA	UGCUAAAUA	UUUUCAAU
	7403	CCAUGGAA	CUGAUGA	X	GAA	AUAUUUAG	CUAAAUAUU	UUCAAUGG
	7404	UCCAUGUA	CUGAUGA	X	GAA	AAUAUUUA	UAAAUUUU	UCAAUGGA
20	7405	UUCCAUG	CUGAUGA	X	GAA	AAUAUUU	AAAUUUUU	CAAUGGAA
	7406	UUCCAUU	CUGAUGA	X	GAA	AAAAUAUU	AAUAUUUUC	AAUGGAAA
	7418	CUAACAUU	CUGAUGA	X	GAA	AGUUUUCC	GGAAAACUA	AAUGUUAG
	7424	GCUAAACU	CUGAUGA	X	GAA	ACAUUUAG	CUAAAUUUU	AGUUUAGC
	7425	AGCUAAAC	CUGAUGA	X	GAA	AACAUUUU	UAAAUUUU	GUUUAGCU
25	7428	AUCAGCUA	CUGAUGA	X	GAA	ACUAACAU	AUGUUAGUU	UAGCUGAU
	7429	AAUCAGCU	CUGAUGA	X	GAA	AACUAACA	UGUUAGUUU	AGCUGAUU
	7430	CAAUCAGC	CUGAUGA	X	GAA	AAACUAAC	GUUAGUUUA	GCUGAUUG
	7437	CCCCAUAC	CUGAUGA	X	GAA	AUCAGCUA	UAGCUGAUU	GUAUGGGG
	7440	AAACCCCA	CUGAUGA	X	GAA	ACAAUCAG	CUGAUUGUA	UGGGGUUU
30	7447	GGUUCGAA	CUGAUGA	X	GAA	ACCCCAUA	UAUGGGGUU	UUCGAACC
	7448	AGGUUCGA	CUGAUGA	X	GAA	AACCCCAU	AUGGGGUUU	UCGAACCU
	7449	AAGGUUCG	CUGAUGA	X	GAA	AAACCCCA	UGGGGUUUU	CGAACCUU
	7450	AAAGGUUC	CUGAUGA	X	GAA	AAAACCCC	GGGGUUUUC	GAACCUUU

	7457	AAAAGUGA	CUGAUGA	X	GAA	AGGUUCGA	UCGAACCUU	UCACUUUU
	7458	AAAAAGUG	CUGAUGA	X	GAA	AAGGUUCG	CGAACCUUU	CACUUUUU
	7459	CAAAAAGU	CUGAUGA	X	GAA	AAAGGUUC	GAACCUUUC	ACUUUUUG
	7463	CAAACAAA	CUGAUGA	X	GAA	AGUGAAAG	CUUUCACUU	UUUGUUUG
5	7464	ACAAACAA	CUGAUGA	X	GAA	AAGUGAAA	UUUCACUUU	UUGUUUGU
	7465	AACAAACA	CUGAUGA	X	GAA	AAAGUGAA	UUCACUUUU	UGUUUGUU
	7466	AAACAAAC	CUGAUGA	X	GAA	AAAAGUGA	UCACUUUUU	GUUUGUUU
	7469	GUAAAACA	CUGAUGA	X	GAA	ACAAAAAG	CUUUUUGUU	UGUUUUAC
	7470	GGUAAAAC	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	GUUUUACC
10	7473	AUAGGUAA	CUGAUGA	X	GAA	ACAAACAA	UUGUUUGUU	UUACCUAU
	7474	AAUAGGUA	CUGAUGA	X	GAA	AACAAACA	UGUUUGUUU	UACCUAUU
	7475	AAAUAGGU	CUGAUGA	X	GAA	AAACAAAC	GUUUUGUUU	ACCUAUUU
	7476	GAAAUAGG	CUGAUGA	X	GAA	AAAACAAA	UUUGUUUUA	CCUAUUUC
	7480	UUGUGAAA	CUGAUGA	X	GAA	AGGUAAAA	UUUUACCUA	UUUCACAA
15	7482	AGUUGUGA	CUGAUGA	X	GAA	AUAGGUAA	UUACCUAUU	UCACAACU
	7483	CAGUUGUG	CUGAUGA	X	GAA	AAUAGGUA	UACCUAUUU	CACAACUG
	7484	ACAGUUGU	CUGAUGA	X	GAA	AAAUAGGU	ACCUAUUUC	ACAACUGU
	7495	UGGCAAUU	CUGAUGA	X	GAA	ACACAGUU	AACUGUGUA	AAUUGCCA
	7499	UUAUUGGC	CUGAUGA	X	GAA	AUUUACAC	GUGUAAAUU	GCCAAUAA
20	7506	ACAGGAAU	CUGAUGA	X	GAA	AUUGGCAA	UUGCCAAUA	AUCCUGU
	7509	UGGACAGG	CUGAUGA	X	GAA	AUUUUGG	CCAAUAAUU	CCUGUCCA
	7510	AUGGACAG	CUGAUGA	X	GAA	AAUUUUG	CAAUAAUUC	CUGUCCAU
	7515	UUUUCAUG	CUGAUGA	X	GAA	ACAGGAAU	AUCCUGUC	CAUGAAAA
	7531	CACUGGAU	CUGAUGA	X	GAA	AUUUGCAU	AUGCAAUUU	AUCCAGUG
25	7532	ACACUGGA	CUGAUGA	X	GAA	AAUUUGCA	UGCAAUUUA	UCCAGUGU
	7534	CUACACUG	CUGAUGA	X	GAA	AUAAUUUG	CAAAUUAUC	CAGUGUAG
	7541	AAUAUAUC	CUGAUGA	X	GAA	ACACUGGA	UCCAGUGUA	GAUAUAUU
	7545	GUCAAAUA	CUGAUGA	X	GAA	AUCUACAC	GUGUAGUAU	UAUUUGAC
	7547	UGGUCAAA	CUGAUGA	X	GAA	AUAUCUAC	GUAGAUUAU	UUUGACCA
30	7549	GAUGGUCA	CUGAUGA	X	GAA	AUAUAUCU	AGAUUAUUU	UGACCAUC
	7550	UGAUGGUC	CUGAUGA	X	GAA	AAUAUAUC	GAUAUAUUU	GACCAUCA
	7557	CAUAGGGU	CUGAUGA	X	GAA	AUGGUCAA	UUGACCAUC	ACCCUAUG
	7563	AAUAUCCA	CUGAUGA	X	GAA	AGGGUGAU	AUCACCCUA	UGGAUAUU

	7569	CUAGCCAA	CUGAUGA	X	GAA	AUCCAUAG	CUAUGGAUA	UUGGCUAG
	7571	AACUAGCC	CUGAUGA	X	GAA	AUAUCCAU	AUGGAUAUU	GGCUAGUU
	7576	GGCAAAAC	CUGAUGA	X	GAA	AGCCAAUA	UAUUGGCUA	GUUUUGCC
	7579	AAAGGCAA	CUGAUGA	X	GAA	ACUAGCCA	UGGCUAGUU	UUGCCUUU
5	7580	UAAAGGCA	CUGAUGA	X	GAA	AACUAGCC	GGCUAGUUU	UGCCUUUA
	7581	AUAAAGGC	CUGAUGA	X	GAA	AAACUAGC	GCUAGUUUU	GCCUUUAU
	7586	GCUUAAUA	CUGAUGA	X	GAA	AGGCAAAA	UUUUGCCUU	UAUUAAGC
	7587	UGC UUAAU	CUGAUGA	X	GAA	AAGGCAAA	UUUGCCUUU	AUUAAGCA
	7588	UUGC UUAA	CUGAUGA	X	GAA	AAAGGCAA	UUGCCUUUA	UUAAGCAA
10	7590	AUUUGCUU	CUGAUGA	X	GAA	AUAAAGGC	GCCUUUAUU	AAGCAAUU
	7591	AAUUUGCU	CUGAUGA	X	GAA	AAUAAAGG	CCUUUAUUA	AGCAAUUU
	7599	CUGAAAUG	CUGAUGA	X	GAA	AUUUGCUU	AAGCAAUUU	CAUUUCAG
	7600	GCUGAAAU	CUGAUGA	X	GAA	AAUUUGCU	AGCAAUUUC	AUUUCAGC
	7603	CAGGCUGA	CUGAUGA	X	GAA	AUGAAUUU	AAAUUCAUU	UCAGCCUG
15	7604	UCAGGCUG	CUGAUGA	X	GAA	AAUGAAUU	AAUUCAUUU	CAGCCUGA
	7605	UUCAGGCU	CUGAUGA	X	GAA	AAAUGAAU	AUUCAUUUC	AGCCUGAA
	7617	UAUAGGCA	CUGAUGA	X	GAA	ACAUUCAG	CUGAAUGUC	UGCCUAUA
	7623	AGAAUUAU	CUGAUGA	X	GAA	AGGCAGAC	GUCUGCCUA	UAUAUUUC
	7625	AGAGAAUA	CUGAUGA	X	GAA	AUAGGCAG	CUGCCUAUA	UAUUCUCU
20	7627	GCAGAGAA	CUGAUGA	X	GAA	AUAUAGGC	GCCUAUAUA	UUCUCUGC
	7629	GAGCAGAG	CUGAUGA	X	GAA	AUAUAUAG	CUAUAUAUU	CUCUGCUC
	7630	AGAGCAGA	CUGAUGA	X	GAA	AAUAUAUA	UAUAUAUUC	UCUGCUCU
	7632	AAAGAGCA	CUGAUGA	X	GAA	AGAAUUAU	UAUAUUCUC	UGCUCUUU
	7637	AAUACAAA	CUGAUGA	X	GAA	AGCAGAGA	UCUCUGCUC	UUUGUAUU
25	7639	AGAAUACA	CUGAUGA	X	GAA	AGAGCAGA	UCUCUCUUU	UGUAUUCU
	7640	GAGAAUAC	CUGAUGA	X	GAA	AAGAGCAG	CUGCUCUUU	GUUUCUC
	7643	AAGGAGAA	CUGAUGA	X	GAA	ACAAAGAG	CUCUUUGUA	UUCUCCUU
	7645	CAAAGGAG	CUGAUGA	X	GAA	AUACAAAG	CUUUGUAUU	CUCCUUUG
	7646	UCAAAAGGA	CUGAUGA	X	GAA	AAUACAAA	UUUGUAUUC	UCCUUUGA
30	7648	GUUCAAAAG	CUGAUGA	X	GAA	AGAAUACA	UGUAUUCUC	CUUUGAAC
	7651	CGGGUUCA	CUGAUGA	X	GAA	AGGAGAAU	AUUCUCCUU	UGAACCCG
	7652	ACGGGUUC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUU	GAACCCGU
	7661	GAUGUUUU	CUGAUGA	X	GAA	ACGGGUUC	GAACCCGUU	AAAACAUC

90

7662 GGAUGUUU CUGAUGA X GAA AACGGGUU AACCCGUUA AAACAUC

7669 UGCCACAG CUGAUGA X GAA AUGUUUUA UAAAACAUC CUGUGGCA

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II  
5 may be  $\geq 2$  base-pairs.



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Table III: Human *flt1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequence

nt.	HP Ribozyme Sequence		Substrate
	Position		
	16	CGGGGAGG AGAA GAGAGG ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	CCUCUCG GCU CCUCCCCG
5	39	CCGCUCCG AGAA GCCGCC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GGCGCG GCU CGGAGCGG
	180	CCGCCAGA AGAA GUCCUC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GAGGACG GAC UCUGGCGG
	190	AACGACCC AGAA GCCAGA ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	UCUGGCG GCC GGGUCGUU
	278	GGCGGCAC AGAA GGACCC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GGGUCCU GCU GUGCGCGC
	290	GACAGCUG AGAA GCGCGC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GGCGCGU GCU CAGCUGUC
10	295	AAGCAGAC AGAA GAGCAG ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	CUGCUCU GCU GUCUGCUCU
	298	GAGAAGCA AGAA GCUGAG ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	CUCAGCU GUC UGCUUCUC
	302	CUGUGAGA AGAA GACAGC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GCUGUCU GCU UCUCACAG
	420	CAUUUAUG AGAA GCUUCC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GGAAAGCA GCC CAUAAAUG
	486	CUUCCACA AGAA GAUUUA ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	UAAAUCU GCC UGUGGAAG
15	537	UUUGCUUG AGAA GUGUUC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GAACACA GCU CAAGCAAA
	565	AUAUUUGC AGAA GUAGAA ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	UUCUACA GCU GCAAAUAU
	721	CGUAACCC AGAA GGGAU ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	AUUCUUU GCC GGGUUACG
	786	CGUUUUC AGAA GGGAUC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GAUCCCU GAU GGAAAACG
	863	CUUCACAG AGAA GAAGCC ACCAGAGAAAACACACGUGUGGUA CAUUAACCUGGUA	GGCUUCU GAC CUGUGAAG

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1056	UUUUUUUC	AGAA	GGGUA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UUACCCU	GAU	GAU	AAAAAAA
1301	GCCGGUA	AGAA	GCUUGC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GCAAGCG	GUC	UUACCGGC	
1310	UCAUAGAG	AGAA	GGUAAG	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	CUUACCG	GCU	CUCUAUGA	
1389	AAAUAGCG	AGAA	GAUUUC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GAUUAUCU	GCU	CGCUAUUU	
5	UUUCGUAA	AGAA	GGGGUU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AAACCCCA	GAU	UUACGAAA	
1566	AGAGCCGG	AGAA	GGAAAC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GUUUCCA	GAC	CCGGCUCU	
1572	GGGUAGAG	AGAA	GGGUCU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AGACCCG	GCU	CUCUACCC	
1604	CGGUACAA	AGAA	GGAUUU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AAAUCCU	GAC	UUGUACCG	
1824	AUUCUAGA	AGAA	GCCACA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGUGGCU	GAC	UCUAGAAU	
10	UUUGGCAC	AGAA	GUGAUA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UAUCACA	GAU	GUGCCAAA	
1949	CUCCUUC	AGAA	GCAUUU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AAAUGCC	GAC	GGAAGGAG	
1973	CUGUGCAA	AGAA	GUUUCA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGAAACU	GUC	UUGCACAG	
2275	AGUGGUGG	AGAA	GCUGAU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AUCAGCA	GUU	CCACCACU	
2321	ACCAAGUG	AGAA	GAGGCU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AGCCUCA	GAU	CACUUGGU	
15	UUUCAAU	AGAA	GCGUGC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GCACGCU	GUU	UAUUGAAA	
2490	GUUCCUUG	AGAA	GUGAGG	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	CCUCACU	GUU	CAAGGAAC	
2525	UUAGAGUG	AGAA	GCUCCA	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	UGGAGCU	GAU	CACUCUAA	
2625	GAUAGGUA	AGAA	GUCUUU	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	AAAGACU	GAC	UACCUAUC	
2652	GGAACUUC	AGAA	GGGUCC	ACCAGAGAAACACACG	UUUGGUACA	UUACCUGGUA	GGACCCA	GAU	GAAGUUC	

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2684	CAUAAGGG AGAA GCUCAC ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	GUGAGCG GCU CCCUUAUG
2816	CAGCCACA AGAA GGCACG ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	CGUGCCG GAC UGUGGCUG
2873	GCUCAGUC AGAA GAGCUU ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	AAGCUCU GAU GACUGAGC
2930	AGGCUCCC AGAA GGUUAA ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	UUAACCU GCU GGGAGCCU
5 2963	CAAUCACC AGAA GAGGCC ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	GGCCUCU GAU GGUGAUUG
3157	UUCCUGAA AGAA GGAGCU ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	AGCUCCG GCU UUCAGGAA
3207	UAGAAACC AGAA GAAUCC ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	GGAUUCU GAC GGUUUCUA
3211	CUUGUAGA AGAA GUCAGA ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	UCUGACG GUU UCUACAAG
3245	UGUAAGAA AGAA GAUCUU ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	AAGAUCU GAU UUCUUAAC
10 3256	CACUUGAA AGAA GUAAGA ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	UCUUAAC GUU UUCAAGUG
3287	UUCUGGAA AGAA GGAACU ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	AGUUCU GUC UUCCAGAA
3402	CUCACAUU AGAA GGGUUC ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	GAACCCC GAU UAUGUGAG
3580	CCUCAGGC AGAA GCAAAA ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	UUUUGCA GUC GCCUGAGG
3641	CCAGCAUG AGAA GAUAGA ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	UCUAUCA GAU CAUGCUGG
15 3655	UCUGUGCC AGAA GUCCAG ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	CUGGACU GCU GGCACAGA
3810	UCAGAGAA AGAA GGAGUU ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	AACUCCU GCC UUCUCUGA
3846	AACUUCGG AGAA GAAUUA ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	UAUUUCA GCU CCGAAGUU
3873	CUGACAUC AGAA GAGCUU ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	AAGCUCU GAU GAUGUCAG
3995	GAGAGGCC AGAA GAGUGC ACCAGAGAAACACACGCUUGUGGUACAUAUACCUGGUA	GCACUCU GUU GGCCUCUC

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4100	UGACAUCA AGAA GCGCCG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CGGGGCU GUC UGAUGUCA
4104	CUGCUGAC AGAA GACAGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GCUGUCU GAU GUCAGCAG
4120	AUGGCAGA AGAA GGGCCU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	AGGCCCA GUU UCUGCCAU
4135	GUGCCCAC AGAA GGAUG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CAUUGCA GCU GUGGGCAC
5 4210	GGCGGGG AGAA GCAGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GCUGUCU GCU CCGCGCCC
4217	AGUCUGGG AGAA GGGAGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GCUCCCC GCC CCCAGACU
4224	GAGUUGUA AGAA GGGGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GCCCCCA GAC UACAACUC
4382	CAAAAAGC AGAA GGCUC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GGAGCCA GCU GCUUUUUG
4385	UCACAAAA AGAA GCUGGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GCCAGCU GCU UUUUGUGA
10 4537	GGGGUUGG AGAA GGAAG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CUUCCCU GCU CCAACCCC
4573	CUCAAUCA AGAA GGUCCU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	AGGACCA GUU UGAUUGAG
4594	AUUGGGUG AGAA GUGCAG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CUGCACU GAU CACCCAAU
4628	GGCUGCAG AGAA GGCCCA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UGGGCCA GCC CUGCAGCC
4636	GGGUUUUG AGAA GCAGGG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CCCUGCA GCC CAAAACCC
15 4866	AGGGUCAG AGAA GGAAG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CUUCCCA GCU CUGACCCU
4871	GUAGAAGG AGAA GAGCUG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CAGCUU GAC CCUUCUAC
4905	CGCUGUCC AGAA GCUCCU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	AGGAGCA GAU GGACAGCG
5233	CUGUGCAA AGAA GAAUAA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UUAUUCU GUU UUGCACAG
5281	CUCCUCAG AGAA GCAUUU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	AAAUCCA GUC CUGAGGAG

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5319	UUUCCUCC AGAA GCCCUC ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GAGGGCU GAU GGAGGAAA
5358	GGUAUAGA AGAA GGGUCU ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AGACCCC GUC UCUAUACC
5392	UGGGUCCC AGAA GUGUUG ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CAACACA GUU GGGACCCA
5563	UGAGUCCC AGAA GGAGAA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UUCUCCA GUU GGGACUCA
5622	AGUUUCAA AGAA GUUGAA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UUCAACU GCU UUGAAAACU
5738	UAGCAUCA AGAA GAGCCA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGGCUCU GUU UGAUGCUA
5838	UAGCAUCA AGAA GAGCCA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGGCUCU GUU UGAUGCUA
5933	CCCCAAGA AGAA GCAAUC ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GAUUGCU GCU UCUUGGGG
6022	CACAUAAAG AGAA GAGGCA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGCCUCU GUU CUUAUGUG
6120	UCCACAAA AGAA GCUGCC ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GGCAGCG GCU UUUGUGGA
6163	GUGGAGAG AGAA GUCCCA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGGGACA GUC CUCUCCAC
6270	AAAUUGCC AGAA GUCACA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGUGACA GCU GGCAAUUU
6412	AAGACAUG AGAA GCUAAG ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CUUAGCU GUU CAUGUCUU
6511	UUUGAAGG AGAA GAGUAA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UUACUCA GCU CCUUCAAA
6778	UCCACCCA AGAA GUUCCA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UGGAACA GUC UGGGUGGA
6826	ACUUCUUG AGAA GACAAG ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	CUUGUCA GUC CAAGAAGU
7245	AACAUAAA AGAA GUUGCC ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	GGCAACU GCU UUUUUGUU
7258	UGGAAGGA AGAA GAACAU ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	AUGUUCU GUC UCCUCCCA
7433	CCCAUACA AGAA GCUAAA ACCAGAGAAACACACGUUGUGGUACAUAUACCUGGUA	UUUAGCU GAU UGU AUGGG

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7512	UUUUC AUG AGAA GGAAUU ACCAGAGAAACACACGUGUGUGGUACAUUACCUGGUA	AAUUCU GUC CAUGAAAA
7606	GACAUUCA AGAA GAAUG ACCAGAGAAACACACGUGUGUGGUACAUUACCUGGUA	CAUUUCA GCC UGAAUGUC
7618	AAUAUAUA AGAA GACAUU ACCAGAGAAACACACGUGUGUGGUACAUUACCUGGUA	AAUGUCU GCC UAUAUAUU
7633	AUACAAAG AGAA GAGAAU ACCAGAGAAACACACGUGUGUGGUACAUUACCUGGUA	AUUCUCU GCU CUUUGUAU

Table IV: Human KDR VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

	nt. Posi- tion	HH Ribozyme Sequence	Substrate
5	21	CACAGGGC CUGAUGA X GAA ACGGCCAG	CUGGCCGUC GCCCUGUG
	33	UCCACGCA CUGAUGA X GAA AGCCACAG	CUGUGGCUC UGCGUGGA
	56	AACCCACA CUGAUGA X GAA AGGCGGCC	GGCCGCCUC UGUGGGUU
	64	ACUAGGCA CUGAUGA X GAA ACCCACAG	CUGUGGGUU UGCCUAGU
10	65	CACUAGGC CUGAUGA X GAA AACCCACA	UGUGGGUUU GCCUAGUG
	70	AGAAACAC CUGAUGA X GAA AGGCAAAC	GUUUGCCUA GUGUUUCU
	75	UCAAGAGA CUGAUGA X GAA ACACUAGG	CCUAGUGUU UCUCUUGA
	76	AUCAAGAG CUGAUGA X GAA AACACUAG	CUAGUGUUU CUCUUGAU
	77	GAUCAAGA CUGAUGA X GAA AAACACUA	UAGUGUUUC UCUUGAUC
15	79	CAGAUCAA CUGAUGA X GAA AGAAACAC	GUGUUUCUC UUGAUCUG
	81	GGCAGAUC CUGAUGA X GAA AGAGAAAC	GUUUCUCUU GAUCUGCC
	85	CCUGGGCA CUGAUGA X GAA AUCAAGAG	CUCUUGAUC UGCCCAGG
	96	UGUAUGCU CUGAUGA X GAA AGCCUGGG	CCCAGGCUC AGCAUACA
	102	UCUUUUUG CUGAUGA X GAA AUGCUGAG	CUCAGCAUA CAAAAAGA
20	114	AUUGUAAG CUGAUGA X GAA AUGUCUUU	AAAGACAUU CUUACAAU
	117	UUAAUUGU CUGAUGA X GAA AGUAUGUC	GACAUACUU ACAAUUAA
	118	CUUAAUUG CUGAUGA X GAA AAGUAUGU	ACAUACUUA CAAUUAAG
	123	UUAGCCUU CUGAUGA X GAA AUUGUAAG	CUUACAAUU AAGGCUAA
	124	AUUAGCCU CUGAUGA X GAA AAUUGUAA	UUACAAUUA AGGCUAUU
25	130	AGUUGUAU CUGAUGA X GAA AGCCUUAU	UUAAGGCUA AUACAACU
	133	AAGAGUUG CUGAUGA X GAA AUUAGCCU	AGGCUAUUA CAACUCUU
	139	AAUUGGAA CUGAUGA X GAA AGUUGUAU	AUACAACUC UUCAAAUU
	141	GUAUUUUG CUGAUGA X GAA AGAGUUGU	ACAACUCUU CAAAUUAC
	142	AGUAAUUU CUGAUGA X GAA AAGAGUUG	CAACUCUUC AAAUUACU
30	147	CUGCAAGU CUGAUGA X GAA AUUUGAAG	CUUCAAAUU ACUUGCAG
	148	CCUGCAAG CUGAUGA X GAA AAUUGGAA	UUCAAAUUA CUUGCAGG
	151	UCCCCUGC CUGAUGA X GAA AGUAAUUU	AAAUUACUU GCAGGGGA

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170	GCCAGUCC	CUGAUGA	X	GAA	AGUCCCUC	GAGGGACUU	GGACUGGC
180	UUGGGCCA	CUGAUGA	X	GAA	AGCCAGUC	GACUGGCUU	UGGCCCAA
181	AUUGGGCC	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUU	GGCCCAAU
190	ACUCUGAU	CUGAUGA	X	GAA	AUUGGGCC	GGCCCAAUA	AUCAGAGU
5 193	GCCACUCU	CUGAUGA	X	GAA	AUUAUUGG	CCAAUAAUC	AGAGUGGC
243	UUACAGAA	CUGAUGA	X	GAA	AGGCCAUC	GAUGGCCUC	UUCUGUAA
245	UCUUACAG	CUGAUGA	X	GAA	AGAGGCCA	UGGCCUCUU	CUGUAAGA
246	GUCUUACA	CUGAUGA	X	GAA	AAGAGGCC	GGCCUCUUC	UGUAAGAC
250	GAGUGUCU	CUGAUGA	X	GAA	ACAGAAGA	UCUUCUGUA	AGACACUC
10 258	GGAAUUGU	CUGAUGA	X	GAA	AGUGUCUU	AAGACACUC	ACAAUUCC
264	ACUUUUGG	CUGAUGA	X	GAA	AUUGUGAG	CUCACAAUU	CCAAAAGU
265	CACUUUUG	CUGAUGA	X	GAA	AAUUGUGA	UCACAAUUC	CAAAAGUG
276	UCAUUUCC	CUGAUGA	X	GAA	AUCACUUU	AAAGUGAUC	GGAAAUGA
296	AGCACUUG	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	CAAGUGCU
15 305	CCCGGUAG	CUGAUGA	X	GAA	AGCACUUG	CAAGUGCUU	CUACCGGG
306	UCCCGGUA	CUGAUGA	X	GAA	AAGCACUU	AAGUGCUUC	UACCGGGA
308	UUUCCCGG	CUGAUGA	X	GAA	AGAAGCAC	GUGCUUCUA	CCGGGAAA
323	CCGAGGCC	CUGAUGA	X	GAA	AGUCAGUU	AACUGACUU	GGCCUCGG
329	AAAUGACC	CUGAUGA	X	GAA	AGGCCAAG	CUUGGCCUC	GGUCAUUU
20 333	ACAUAAAU	CUGAUGA	X	GAA	ACCGAGGC	GCCUCGGUC	AUUUAUGU
336	UAGACAU	CUGAUGA	X	GAA	AUGACCGA	UCGGUCAUU	UAUGUCUA
337	AUAGACAU	CUGAUGA	X	GAA	AAUGACCG	CGGUCAUUU	AUGUCUAA
338	CAUAGACA	CUGAUGA	X	GAA	AAAUGACC	GGUCAUUUA	UGUCUAUG
342	UGAACAU	CUGAUGA	X	GAA	ACAUAAAU	AUUUAUGUC	UAUGUUCA
25 344	CUUGAACA	CUGAUGA	X	GAA	AGACAUAA	UUAUGUCUA	UGUUCAAG
348	UAAUCUUG	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUU	CAAGAUUA
349	GUAUUCUU	CUGAUGA	X	GAA	AACAUAGA	UCUAUGUUC	AAGAUUAC
355	AGAUCUGU	CUGAUGA	X	GAA	AUCUUGAA	UUCAAGAUU	ACAGAUCU
356	GAGAUCUG	CUGAUGA	X	GAA	AAUCUUGA	UCAAGAUUA	CAGAUCUC
30 362	UAAAUGGA	CUGAUGA	X	GAA	AUCUGUAA	UUACAGAUU	UCCAUUUA
364	AAUAAAUG	CUGAUGA	X	GAA	AGAUCUGU	ACAGAUCUC	CAUUUAUU
368	AAGCAAUA	CUGAUGA	X	GAA	AUGGAGAU	AUCUCCAUA	UAUUGCUU
369	GAAGCAAU	CUGAUGA	X	GAA	AAUGGAGA	UCUCCAUAU	AUUGCUUC



370	AGAAGCAA	CUGAUGA	X	GAA	AAAUGGAG	CUCCAUUUA	UUGCUUCU
372	ACAGAAGC	CUGAUGA	X	GAA	AUAAAUGG	CCAUUUAUU	GCUUCUGU
376	ACUAACAG	CUGAUGA	X	GAA	AGCAAUAA	UUAUUGCUU	CUGUUAGU
377	CACUAACA	CUGAUGA	X	GAA	AAGCAAUA	UAUUGCUUC	UGUUAGUG
5 381	UGGUCACU	CUGAUGA	X	GAA	ACAGAAGC	GCUUCUGUU	AGUGACCA
382	UUGGUCAC	CUGAUGA	X	GAA	AACAGAAG	CUUCUGUUA	GUGACCAA
399	AUGUACAC	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUC	GUGUACAU
404	CAGUAAUG	CUGAUGA	X	GAA	ACACGACU	AGUCGUGUA	CAUUACUG
408	UUCUCAGU	CUGAUGA	X	GAA	AUGUACAC	GUGUACAUU	ACUGAGAA
10 409	GUUCUCAG	CUGAUGA	X	GAA	AAUGUACA	UGUACAUUA	CUGAGAAC
438	AGACAUGG	CUGAUGA	X	GAA	AUCACCAC	GUGGUGAUU	CCAUGUCU
439	GAGACAUG	CUGAUGA	X	GAA	AAUCACCA	UGGUGAUUC	CAUGUCUC
445	GGACCCGA	CUGAUGA	X	GAA	ACAUGGAA	UUCCAUGUC	UCGGGUCC
447	AUGGACCC	CUGAUGA	X	GAA	AGACAUGG	CCAUGUCUC	GGGUCCAU
15 452	UUGAAAUG	CUGAUGA	X	GAA	ACCCGAGA	UCUCGGGUC	CAUUUCAA
456	AGAUUUGA	CUGAUGA	X	GAA	AUGGACCC	GGGUCCAUU	UCAAUUCU
457	GAGAUUUG	CUGAUGA	X	GAA	AAUGGACC	GGUCCAUUU	CAAAUCUC
458	UGAGAUUU	CUGAUGA	X	GAA	AAAUGGAC	GUCCAUUUC	AAAUCUCA
463	CACGUUGA	CUGAUGA	X	GAA	AUUUGAAA	UUUCAAAUC	UCAACGUG
20 465	GACACGUU	CUGAUGA	X	GAA	AGAUUUGA	UCAAUUCUC	AACGUGUC
473	CACAAAGU	CUGAUGA	X	GAA	ACACGUUG	CAACGUGUC	ACUUUGUG
477	CUUGCACA	CUGAUGA	X	GAA	AGUGACAC	GUGUCACUU	UGUGCAAG
478	UCUUGCAC	CUGAUGA	X	GAA	AAGUGACA	UGUCACUUU	GUGCAAGA
488	UUUCUGGG	CUGAUGA	X	GAA	AUCUUGCA	UGCAAGAUU	CCCAGAAA
25 503	CAGGAACA	CUGAUGA	X	GAA	AUCUCUUU	AAAGAGAUU	UGUCCUG
504	UCAGGAAC	CUGAUGA	X	GAA	AAUCUCUU	AAGAGAUUU	GUUCCUGA
507	CCAUCAGG	CUGAUGA	X	GAA	ACAAAUCU	AGAUUUGUU	CCUGAUGG
508	ACCAUCAG	CUGAUGA	X	GAA	AACAAUUC	GAUUUGUUC	CUGAUGGU
517	AAUUCUGU	CUGAUGA	X	GAA	ACCAUCAG	CUGAUGGUA	ACAGAAUU
30 525	UCCCAGGA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU	UCCUGGGA
526	GUCCCAGG	CUGAUGA	X	GAA	AAUUCUGU	ACAGAAUUU	CCUGGGAC
527	UGUCCCAG	CUGAUGA	X	GAA	AAAUUCUG	CAGAAUUUC	CUGGGACA
548	GAAUAGUA	CUGAUGA	X	GAA	AGCCCUUC	GAAGGGCUU	UACUAIUC

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	549	GGAAUAGU	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUU	ACUAUUCC
	550	GGGAAUAG	CUGAUGA	X	GAA	AAAGCCCU	AGGGCUUUA	CUAUUCCC
	553	GCUGGGAA	CUGAUGA	X	GAA	AGUAAAGC	GCUUUACUA	UUCCCAGC
	555	UAGCUGGG	CUGAUGA	X	GAA	AUAGUAAA	UUUACUAUU	CCCAGCUA
5	556	GUAGCUGG	CUGAUGA	X	GAA	AAUAGUAA	UUACUAUUC	CCAGCUAC
	563	UGAUCAUG	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCUA	CAUGAUCA
	570	GCAUAGCU	CUGAUGA	X	GAA	AUCAUGUA	UACAUGAUC	AGCUAUGC
	575	UGCCAGCA	CUGAUGA	X	GAA	AGCUGAUC	GAUCAGCUA	UGCUGGCA
	588	UCACAGAA	CUGAUGA	X	GAA	ACCAUGCC	GGCAUGGUC	UUCUGUGA
10	590	CUUCACAG	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUU	CUGUGAAG
	591	GCUUCACA	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUC	UGUGAAGC
	606	UCAUCAUU	CUGAUGA	X	GAA	AUUUUUGC	GCAAAAUUU	AAUGAUGA
	607	UUCAUCAU	CUGAUGA	X	GAA	AAUUUUUG	CAAAAUAUA	AUGAUGAA
	619	AGACUGGU	CUGAUGA	X	GAA	ACUUUCAU	AUGAAAGUU	ACCAGUCU
15	620	UAGACUGG	CUGAUGA	X	GAA	AACUUUCA	UGAAAGUUA	CCAGUCUA
	626	ACAUAAUA	CUGAUGA	X	GAA	ACUGGUAA	UUACCAGUC	UAUUAUGU
	628	GUACAUAA	CUGAUGA	X	GAA	AGACUGGU	ACCAGUCUA	UUAUGUAC
	630	AUGUACAU	CUGAUGA	X	GAA	AUAGACUG	CAGUCUAUU	AUGUACAU
	631	UAUGUACA	CUGAUGA	X	GAA	AAUAGACU	AGUCUAUUA	UGUACAU
20	635	CAACUAUG	CUGAUGA	X	GAA	ACAUAAUA	UAUUAUGUA	CAUAGUUG
	639	ACGACAAC	CUGAUGA	X	GAA	AUGUACAU	AUGUACAU	GUUGUCGU
	642	ACAACGAC	CUGAUGA	X	GAA	ACUAUGUA	UACAUAGUU	GUCGUUGU
	645	CCUACAAC	CUGAUGA	X	GAA	ACAACUAU	AUAGUUGUC	GUUGUAGG
	648	UACCCUAC	CUGAUGA	X	GAA	ACGACAAC	GUUGUCGUU	GUAGGGUA
25	651	CUAUACCC	CUGAUGA	X	GAA	ACAACGAC	GUCGUUGUA	GGGUUAUG
	656	AAAUCCUA	CUGAUGA	X	GAA	ACCCUACA	UGUAGGGUA	UAGGAUUU
	658	AUAAAUCC	CUGAUGA	X	GAA	AUACCCUA	UAGGGUAUA	GGAUUUUA
	663	ACAUCAUA	CUGAUGA	X	GAA	AUCCUAUA	UAUAGGAUU	UAUGAUGU
	664	CACAUCAU	CUGAUGA	X	GAA	AAUCCUAU	AUAGGAUUU	AUGAUGUG
30	665	CCACAUCA	CUGAUGA	X	GAA	AAAUCCUA	UAGGAUUUA	UGAUGUGG
	675	GGACUCAG	CUGAUGA	X	GAA	ACCACAUC	GAUGUGGUU	CUGAGUCC
	676	CGGACUCA	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUC	UGAGUCCG
	682	AUGAGACG	CUGAUGA	X	GAA	ACUCAGAA	UUCUGAGUC	CGUCUCAU

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686	UUCCAUGA	CUGAUGA	X	GAA	ACGGACUC	GAGUCCGUC	UCAUGGAA
688	AAUUCCAU	CUGAUGA	X	GAA	AGACGGAC	GUCCGUCUC	AUGGAAUU
696	GAUAGUUC	CUGAUGA	X	GAA	AUUCCAUG	CAUGGAAUU	GAACUAUC
702	CCAACAGA	CUGAUGA	X	GAA	AGUUCAAU	AUUGAACUA	UCUGUUGG
5	704	CUCCAACA	CUGAUGA	X	GAA	AUAGUJCA	UGAACUAUC
708	UUUUCUCC	CUGAUGA	X	GAA	ACAGAUAG	CUAUCUGUU	GGAGAAAA
720	UUUAAGAC	CUGAUGA	X	GAA	AGCUUUUC	GAAAAGCUU	GUCUUAAA
723	CAUUUUA	CUGAUGA	X	GAA	ACAAGCUU	AAGCUUGUC	UUAAAUUG
725	UACAAUUU	CUGAUGA	X	GAA	AGACAAGC	GCUUGUCUU	AAAUUGUA
10	726	GUACAAUU	CUGAUGA	X	GAA	AAGACAAG	CUUGUCUUA
730	UGCUGUAC	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUU	GUACAGCA
733	UCUUGCUG	CUGAUGA	X	GAA	ACAAUUUA	UAAAUUGUA	CAGCAAGA
750	CCCACAUU	CUGAUGA	X	GAA	AGUUCAGU	ACUGAACUA	AAUGUGGG
762	UUGAAGUC	CUGAUGA	X	GAA	AUCCCCAC	GUGGGGAUU	GACUUCAA
15	767	CCCAGUUG	CUGAUGA	X	GAA	AGUCAAUU	GAUUGACUU
768	UCCCAGUU	CUGAUGA	X	GAA	AAGUCAAU	AUUGACUUC	AACUGGGA
779	AAGAAGGG	CUGAUGA	X	GAA	AUUCCCAG	CUGGGAAUA	CCCUUCUU
784	CUUCGAAG	CUGAUGA	X	GAA	AGGGUAUU	AAUACCCUU	CUUCGAAG
785	GCUUCGAA	CUGAUGA	X	GAA	AAGGGUAU	AUACCCUUC	UUCGAAGC
20	787	AUGCUUCG	CUGAUGA	X	GAA	AGAAGGGU	ACCCUUCUU
788	GAUGCUUC	CUGAUGA	X	GAA	AAGAAGGG	CCCUUCUUC	GAAGCAUC
796	CUUAUGCU	CUGAUGA	X	GAA	AUGCUUCG	CGAAGCAUC	AGCAUAAG
802	AAGUUUCU	CUGAUGA	X	GAA	AUGCUGAU	AUCAGCAUA	AGAAACUU
810	CGGUUUAC	CUGAUGA	X	GAA	AGUUUCUU	AAGAAACUU	GUAAACCG
25	813	UCUCGGUU	CUGAUGA	X	GAA	ACAAGUUU	AAACUUGUA
825	UGGGUUUU	CUGAUGA	X	GAA	AGGUCUCG	CGAGACCUA	AAAACCCA
836	CACUCCCA	CUGAUGA	X	GAA	ACUGGGUU	AACCCAGUC	UGGGAGUG
857	UGCUCAAA	CUGAUGA	X	GAA	AUUUCUUC	GAAGAAAUU	UUUGAGCA
858	GUGCUCAA	CUGAUGA	X	GAA	AAUUUCUU	AAGAAAUUU	UUGAGCAC
30	859	GGUGCUCU	CUGAUGA	X	GAA	AAAUUUCU	AGAAAUUUU
860	AGGUGCUC	CUGAUGA	X	GAA	AAAAUJUC	GAAAUUUUU	GAGCACCUC
869	CUAUAGUU	CUGAUGA	X	GAA	AGGUGCUC	GAGCACCUC	AACUAUAG
870	UCUAUAGU	CUGAUGA	X	GAA	AAGGUGCU	AGCACCUCU	ACUAUAGA

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874	ACCAUCUA	CUGAUGA	X	GAA	AGUUAAGG	CCUUAACUA	UAGAUGGU
876	ACACCAUC	CUGAUGA	X	GAA	AUAGUUA	UUAACUAUA	GAUGGUGU
885	CUCCGGGU	CUGAUGA	X	GAA	ACACCAUC	GAUGGUGUA	ACCCGGAG
905	AGGUGUAC	CUGAUGA	X	GAA	AUCCUUGG	CCAAGGAUU	GUACACCU
5 908	CACAGGUG	CUGAUGA	X	GAA	ACAAUCCU	AGGAUUGUA	CACCUGUG
923	GCCCACUG	CUGAUGA	X	GAA	AUGCUGCA	UGCAGCAUC	CAGUGGGC
956	CCCUGACA	CUGAUGA	X	GAA	AUGUGCUG	CAGCACAUU	UGUCAGGG
957	ACCCUGAC	CUGAUGA	X	GAA	AAUGUGCU	AGCACAUUU	GUCAGGGU
960	UGGACCCU	CUGAUGA	X	GAA	ACAAAUGU	ACAUUUGUC	AGGGUCCA
10 966	UUUUCAUG	CUGAUGA	X	GAA	ACCCUGAC	GUCAGGGUC	CAUGAAAA
979	AGCAACAA	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUU	UUGUUGCU
980	AAGCAACA	CUGAUGA	X	GAA	AAGGUUUU	AAAACCUUU	UGUUGCUU
981	AAAGCAAC	CUGAUGA	X	GAA	AAAGGUUU	AAACCUUUU	GUUGCUUU
984	CCAAAAGC	CUGAUGA	X	GAA	ACAAAAGG	CCUUUUGUU	GCUUUUGG
15 988	ACUUCCAA	CUGAUGA	X	GAA	AGCAACAA	UUGUUGCUU	UUGGAAGU
989	CACUCCA	CUGAUGA	X	GAA	AAGCAACA	UGUUGCUUU	UGGAAGUG
990	CCACUCC	CUGAUGA	X	GAA	AAAGCAAC	GUUGCUUUU	GGAGUGG
1007	CCACCAGA	CUGAUGA	X	GAA	AUCCAUG	CAUGGAAUC	UCUGGUGG
1009	UUCCACCA	CUGAUGA	X	GAA	AGAUCCA	UGGAAUCUC	UGGUGGAA
20 1038	GGGAUUCU	CUGAUGA	X	GAA	ACACGCUC	GAGCGUGUC	AGAAUCCC
1044	UUCGCAGG	CUGAUGA	X	GAA	AUUCUGAC	GUCAGAAUC	CCUGCGAA
1055	AACCAAGG	CUGAUGA	X	GAA	ACUUCGCA	UGCGAAGUA	CCUUGGUU
1059	GGGUAACC	CUGAUGA	X	GAA	AGGUACUU	AAGUACCUU	GGUUACCC
1063	GGGUGGGU	CUGAUGA	X	GAA	ACCAAGGU	ACCUUGGUU	ACCCACCC
25 1064	GGGGUGGG	CUGAUGA	X	GAA	AACCAAGG	CCUUGGUUA	CCCACCCC
1080	UACCAUUU	CUGAUGA	X	GAA	AUUUCUGG	CCAGAAUAU	AAAUGGUA
1088	CAUUUUUA	CUGAUGA	X	GAA	ACCAUUUU	AAAAUGGUA	UAAAAAUG
1090	UCCAUUUU	CUGAUGA	X	GAA	AUACCAUU	AAUGGUUAU	AAAAUGGA
1101	UCAAGGGG	CUGAUGA	X	GAA	AUCCAUUU	AAUGGAAUA	CCCCUUGA
30 1107	UUGGACUC	CUGAUGA	X	GAA	AGGGGUUU	AUACCCCUU	GAGUCCAA
1112	UGUGAUUG	CUGAUGA	X	GAA	ACUCAAGG	CCUUGAGUC	CAAUCACA
1117	AAUUGUGU	CUGAUGA	X	GAA	AUUGGACU	AGUCCAAUC	ACACAAUU
1125	CCCGCUUU	CUGAUGA	X	GAA	AUUGUGUG	CACACAAUU	AAAGCGGG

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	1126	CCCCGCUU	CUGAUGA	X	GAA	AAUUGUGU	ACACAAUUA	AAGCGGGG
	1140	AUCGUCAG	CUGAUGA	X	GAA	ACAUGCCC	GGGCAUGUA	CUGACGAU
	1149	ACUUCCAU	CUGAUGA	X	GAA	AUCGUCAG	CUGACGAUU	AUGGAAGU
	1150	CACUCCA	CUGAUGA	X	GAA	AAUCGUCA	UGACGAUUA	UGGAAGUG
5	1180	GACAGUGU	CUGAUGA	X	GAA	AUUUCCUG	CAGGAAAUU	ACACUGUC
	1181	UGACAGUG	CUGAUGA	X	GAA	AAUUUCCU	AGGAAAUUA	CACUGUCA
	1188	GUAAGGAU	CUGAUGA	X	GAA	ACAGUGUA	UACACUGUC	AUCCUUAC
	1191	UUGGUAAG	CUGAUGA	X	GAA	AUGACAGU	ACUGUCAUC	CUUACCAA
	1194	GGAUUGGU	CUGAUGA	X	GAA	AGGAUGAC	GUCAUCCUU	ACCAAUCC
10	1195	GGGAUUGG	CUGAUGA	X	GAA	AAGGAUGA	UCAUCCUUA	CCAAUCCC
	1201	UGAAAUGG	CUGAUGA	X	GAA	AUUGGUAA	UUACCAAUC	CCAUUUCA
	1206	UCCUUUGA	CUGAUGA	X	GAA	AUGGGAUU	AAUCCCAUU	UCAAAGGA
	1207	CUCCUUUG	CUGAUGA	X	GAA	AAUGGGAU	AUCCCAUUU	CAAAGGAG
	1208	UCUCCUUU	CUGAUGA	X	GAA	AAAUGGGA	UCCCAUUUC	AAAGGAGA
15	1233	ACCAGAGA	CUGAUGA	X	GAA	ACCACAUG	CAUGUGGUC	UCUCUGGU
	1235	CAACCAGA	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUC	UCUGGUUG
	1237	CACAACCA	CUGAUGA	X	GAA	AGAGACCA	UGGUCUCUC	UGGUUGUG
	1242	ACAUACAC	CUGAUGA	X	GAA	ACCAGAGA	UCUCUGGUU	GUGUAUGU
	1247	GUGGGACA	CUGAUGA	X	GAA	ACACAACC	GGUUGUGUA	UGUCCCAC
20	1251	UGGGGUGG	CUGAUGA	X	GAA	ACAUACAC	GUGUAUGUC	CCACCCCA
	1263	UUCUCACC	CUGAUGA	X	GAA	AUCUGGGG	CCCCAGAUU	GGUGAGAA
	1274	AGAUUAGA	CUGAUGA	X	GAA	AUUUCUCA	UGAGAAUUC	UCUAAUCU
	1276	AGAGAUUA	CUGAUGA	X	GAA	AGAUUUCU	AGAAAUCUC	UAAUCUCU
	1278	GGAGAGAU	CUGAUGA	X	GAA	AGAGAUUU	AAAUCUCUA	AUCUCUCC
25	1281	ACAGGAGA	CUGAUGA	X	GAA	AUUAGAGA	UCUCUAAUC	UCUCCUGU
	1283	CCACAGGA	CUGAUGA	X	GAA	AGAUUAGA	UCUAAUCUC	UCCUGUGG
	1285	AUCCACAG	CUGAUGA	X	GAA	AGAGAUUA	UAAUCUCUC	CUGUGGAU
	1294	CUGGUAGG	CUGAUGA	X	GAA	AUCCACAG	CUGUGGAUU	CCUACCAG
	1295	ACUGGUAG	CUGAUGA	X	GAA	AAUCCACA	UGUGGAUUC	CUACCAGU
30	1298	CGUACUGG	CUGAUGA	X	GAA	AGGAAUCC	GGAUUCCUA	CCAGUACG
	1304	UGGUGCCG	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUA	CGGCACCA
	1315	CAGCGUUU	CUGAUGA	X	GAA	AGUGGUGC	GCACCACUC	AAACGCUG
	1330	AUAGACCG	CUGAUGA	X	GAA	ACAUGUCA	UGACAUGUA	CGGUCUAU

	1335	AUGGCAUA	CUGAUGA	X	GAA	ACCGUACA	UGUACGGUC	UAUGCCAU
	1337	GAAUGGCA	CUGAUGA	X	GAA	AGACCGUA	UACGGUCUA	UGCCAUUC
	1344	GGGGGAGG	CUGAUGA	X	GAA	AUGGCAUA	UAUGCCAUU	CCUCCCCC
	1345	CGGGGGAG	CUGAUGA	X	GAA	AAUGGCAU	AUGCCAUUC	CUCCCCCG
5	1348	AUGCGGGG	CUGAUGA	X	GAA	AGGAAUGG	CCAUUCCUC	CCCCGCAU
	1357	GUGGAUGU	CUGAUGA	X	GAA	AUGCGGGG	CCCCGCAUC	ACAUCCAC
	1362	UACCAGUG	CUGAUGA	X	GAA	AUGUGAUG	CAUCACAUC	CACUGGUA
	1370	ACUGCCAA	CUGAUGA	X	GAA	ACCAGUGG	CCACUGGUA	UUGGCAGU
	1372	CAACUGCC	CUGAUGA	X	GAA	AUACCAGU	ACUGGUUUU	GGCAGUUG
10	1379	CUUCCUCC	CUGAUGA	X	GAA	ACUGCCAA	UUGGCAGUU	GGAGGAAG
	1416	GUCACUGA	CUGAUGA	X	GAA	ACAGCUUG	CAAGCUGUC	UCAGUGAC
	1418	UUGUCACU	CUGAUGA	X	GAA	AGACAGCU	AGCUGUCUC	AGUGACAA
	1433	CACAAGGG	CUGAUGA	X	GAA	AUGGGUUU	AAACCCAUA	CCCUUGUG
	1438	UUCUUCAC	CUGAUGA	X	GAA	AGGGUAUG	CAUACCCUU	GUGAAGAA
15	1466	CUCCCUGG	CUGAUGA	X	GAA	AGUCCUCC	GGAGGACUU	CCAGGGAG
	1467	CCUCCCUG	CUGAUGA	X	GAA	AAGUCCUC	GAGGACUUC	CAGGGAGG
	1480	UUCAAUUU	CUGAUGA	X	GAA	AUUUCCUC	GAGGAAUA	AAAUUGAA
	1485	UUAACUUC	CUGAUGA	X	GAA	AUUUUUUU	AAUAAAAUU	GAAGUUAA
	1491	UUUUUAUU	CUGAUGA	X	GAA	ACUUCAAU	AUUGAAGUU	AAUAAAAA
20	1492	AUUUUUAU	CUGAUGA	X	GAA	AACUUCAA	UUGAAGUUA	AUAAAAAU
	1495	UUGAUUUU	CUGAUGA	X	GAA	AUUAACUU	AAGUUAAUA	AAAAUCA
	1501	AGCAAUUU	CUGAUGA	X	GAA	AUUUUUAU	AUAAAAAUC	AAUUUGCU
	1505	UUAGAGCA	CUGAUGA	X	GAA	AUUGAUUU	AAAUCAAUU	UGCUCUAA
	1506	AUUAGAGC	CUGAUGA	X	GAA	AAUUGAUU	AAUCAAUUU	GCUCUAAU
25	1510	UUCAAUUA	CUGAUGA	X	GAA	AGCAAUUU	AAUUUGCUC	UAAUUGAA
	1512	CCUUCAAU	CUGAUGA	X	GAA	AGAGCAAA	UUUGCUCUA	AUUGAAGG
	1515	UUUCCUUC	CUGAUGA	X	GAA	AUUAGAGC	GCUCUAAUU	GAAGGAAA
	1536	AGGGUACU	CUGAUGA	X	GAA	ACAGUUUU	AAAACUGUA	AGUACCCU
	1540	AACAAGGG	CUGAUGA	X	GAA	ACUUACAG	CUGUAAGUA	CCCUUGUU
30	1545	UGGAUAAC	CUGAUGA	X	GAA	AGGGUACU	AGUACCCUU	GUUAUCCA
	1548	GCUUGGAU	CUGAUGA	X	GAA	ACAAGGGU	ACCCUUGUU	AUCCAAGC
	1549	CGCUUGGA	CUGAUGA	X	GAA	AACAAGGG	CCCUUGUUA	UCCAAGCG
	1551	GCCGCUUG	CUGAUGA	X	GAA	AUAACAAG	CUUGUUAUC	CAAGCGGC

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	1568	ACAAAGCU	CUGAUGA	X	GAA	ACACAUUU	AAAUGUGUC	AGCUUUGU
	1573	UUUGUACA	CUGAUGA	X	GAA	AGCUGACA	UGUCAGCUU	UGUACAAA
	1574	AUUUGUAC	CUGAUGA	X	GAA	AAGCUGAC	GUCAGCUUU	GUACAAAU
	1577	CACAUUUG	CUGAUGA	X	GAA	ACAAAGCU	AGCUUUGUA	CAAAUGUG
5	1593	ACUUUGUU	CUGAUGA	X	GAA	ACCGCUUC	GAAGCGGUC	AACAAAGU
	1602	CCUCUCCC	CUGAUGA	X	GAA	ACUUUGUU	AACAAAGUC	GGGAGAGG
	1623	UGGAAGGA	CUGAUGA	X	GAA	AUCACCCU	AGGGUGAUC	UCCUUGCA
	1625	CGUGGAAG	CUGAUGA	X	GAA	AGAUCACC	GGUGAUCUC	CUUCCACG
	1628	UCACGUGG	CUGAUGA	X	GAA	AGGAGAUC	GAUCUCCUU	CCACGUGA
10	1629	GUCACGUG	CUGAUGA	X	GAA	AAGGAGAU	AUCUCCUUC	CACGUGAC
	1645	AAUUUCAG	CUGAUGA	X	GAA	ACCCUGG	CCAGGGGUC	CUGAAAUU
	1653	UGCAAAGU	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUU	ACUUUGCA
	1654	UUGCAAAG	CUGAUGA	X	GAA	AAUUUCAG	CUGAAAUUA	CUUUGCAA
	1657	AGGUUGCA	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU	UGCAACCU
15	1658	CAGGUUGC	CUGAUGA	X	GAA	AAGUAAUU	AAAUUACUU	GCAACCUG
	1697	ACCACAAA	CUGAUGA	X	GAA	ACACGCUC	GAGCGUGUC	UUUGUGGU
	1699	GCACCACA	CUGAUGA	X	GAA	AGACACGC	GCGUGUCUU	UGUGGUGC
	1700	UGCACCAC	CUGAUGA	X	GAA	AAGACACG	CGUGUCUUU	GUGGUGCA
	1721	CAAACGUA	CUGAUGA	X	GAA	AUCUGUCU	AGACAGAUC	UACGUUUG
20	1723	CUCAAACG	CUGAUGA	X	GAA	AGAUCUGU	ACAGAUCUA	CGUUUGAG
	1727	GGUUCUCA	CUGAUGA	X	GAA	ACGUAGAU	AUCUACGUU	UGAGAACC
	1728	AGGUUCUC	CUGAUGA	X	GAA	AACGUAGA	UCUACGUUU	GAGAACCUC
	1737	UACCAUGU	CUGAUGA	X	GAA	AGGUUCUC	GAGAACCUC	ACAUGGUA
	1745	CAAGCUUG	CUGAUGA	X	GAA	ACCAUGUG	CACAUGGUA	CAAGCUUG
25	1752	UGUGGGCC	CUGAUGA	X	GAA	AGCUUGUA	UACAAGCUU	GGCCCCACA
	1765	GAUUGGCA	CUGAUGA	X	GAA	AGGCUGUG	CACAGCCUC	UGCCAAUC
	1773	CCCACAUG	CUGAUGA	X	GAA	AUUGGCAG	CUGCCAAUC	CAUGUGGG
	1787	GUGUGGGC	CUGAUGA	X	GAA	ACUCUCCC	GGGAGAGUU	GCCCCACAC
	1800	UUCUUGCA	CUGAUGA	X	GAA	ACAGGUGU	ACACCUGUU	UGCAAGAA
30	1801	GUUCUUGC	CUGAUGA	X	GAA	AACAGGUG	CACCUGUUU	GCAAGAAC
	1811	GAGUAUCC	CUGAUGA	X	GAA	AGUUCUUG	CAAGAACUU	GGAUACUC
	1816	CCAAAGAG	CUGAUGA	X	GAA	AUCCAAGU	ACUUGGAUA	CUCUUUGG
	1819	UUUCCAAA	CUGAUGA	X	GAA	AGUAUCCA	UGGAUACUC	UUUGGAAA

	1821	AAUUUCCA	CUGAUGA	X	GAA	AGAGUAUC	GAUACUCUU	UGGAAAUU
	1822	CAAUUUCC	CUGAUGA	X	GAA	AAGAGUAU	AUACUCUUU	GGAAAUUG
	1829	UGGCAUUC	CUGAUGA	X	GAA	AUUUCCAA	UUGGAAAUU	GAAUGCCA
	1844	UAUUAGAG	CUGAUGA	X	GAA	ACAUGGUG	CACCAUGUU	CUCUAAUA
5	1845	CUAUUAGA	CUGAUGA	X	GAA	AACAUGGU	ACCAUGUUC	UCUAAUAG
	1847	UGCUAUUA	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUC	UAAUAGCA
	1849	UGUGCUAU	CUGAUGA	X	GAA	AGAGAACA	UGUUCUCUA	AUAGCACA
	1852	AUUUGUGC	CUGAUGA	X	GAA	AUUAGAGA	UCUCUAAUA	GCACAAAU
	1866	AUGAUCAA	CUGAUGA	X	GAA	AUGUCAUU	AAUGACAUU	UUGAUCAU
10	1867	CAUGAUCA	CUGAUGA	X	GAA	AAUGUCAU	AUGACAUUU	UGAUCAUG
	1868	CCAUGAUC	CUGAUGA	X	GAA	AAAUGUCA	UGACAUUUU	GAUCAUGG
	1872	AGCUCCAU	CUGAUGA	X	GAA	AUCAAAAU	AUUUUGAUC	AUGGAGCU
	1881	GCAUUCUU	CUGAUGA	X	GAA	AGCUCCAU	AUGGAGCUU	AAGAAUGC
	1882	UGCAUUCU	CUGAUGA	X	GAA	AAGCUCCA	UGGAGCUUA	AGAAUGCA
15	1892	CCUGCAAG	CUGAUGA	X	GAA	AUGCAUUC	GAAUGCAUC	CUUGCAGG
	1895	GGUCCUGC	CUGAUGA	X	GAA	AGGAUGCA	UGCAUCCUU	GCAGGACC
	1913	GGCAGACA	CUGAUGA	X	GAA	AGUCUCCU	AGGAGACUA	UGUCUGCC
	1917	GCAAGGCA	CUGAUGA	X	GAA	ACAUAGUC	GACUAUGUC	UGCCUUGC
	1923	UCUUGAGC	CUGAUGA	X	GAA	AGGCAGAC	GUCUGCCUU	GCUCAAGA
20	1927	CCUGUCUU	CUGAUGA	X	GAA	AGCAAGGC	GCCUUGCUC	AAGACAGG
	1954	GACCACGC	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUU	GCGUGGUC
	1962	AGCUGCCU	CUGAUGA	X	GAA	ACCACGCA	UGCGUGGUC	AGGCAGCU
	1971	AGGACUGU	CUGAUGA	X	GAA	AGCUGCCU	AGGCAGCUC	ACAGUCCU
	1977	CGCUCUAG	CUGAUGA	X	GAA	ACUGUGAG	CUCACAGUC	CUAGAGCG
25	1980	ACACGCUC	CUGAUGA	X	GAA	AGGACUGU	ACAGUCCUA	GAGCGUGU
	2001	UUUCCUGU	CUGAUGA	X	GAA	AUCGUGGG	CCCACGAUC	ACAGGAAA
	2020	UGUCGUCU	CUGAUGA	X	GAA	AUUCUCCA	UGGAGAAUC	AGACGACA
	2032	UUCCCCAA	CUGAUGA	X	GAA	ACUUGUCG	CGACAAGUA	UUGGGGAA
	2034	CUUUCCCC	CUGAUGA	X	GAA	AUACUUGU	ACAAGUAUU	GGGGAAAG
30	2046	GAGACUUC	CUGAUGA	X	GAA	AUGCUUUC	GAAAGCAUC	GAAGUCUC
	2052	GUGCAUGA	CUGAUGA	X	GAA	ACUUCGAU	AUCGAAGUC	UCAUGCAC
	2054	CCGUGCAU	CUGAUGA	X	GAA	AGACUUCG	CGAAGUCUC	AUGCACGG
	2066	GAUUCCCA	CUGAUGA	X	GAA	AUGCCGUG	CACGGCAUC	UGGGAAUC



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	2074	UGGAGGGG	CUGAUGA	X	GAA	AUUCCCAG	CUGGGAAUC	CCCCUCCA
	2080	GAUCUGUG	CUGAUGA	X	GAA	AGGGGGAU	AUCCCCCUC	CACAGAUC
	2088	AACCACAU	CUGAUGA	X	GAA	AUCUGUGG	CCACAGAUC	AUGUGGUU
	2096	UAUCUUUA	CUGAUGA	X	GAA	ACCACAUG	CAUGUGGUU	UAAAGAU
5	2097	UUAUCUUU	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUU	AAAGAUAA
	2098	AUUAUCUU	CUGAUGA	X	GAA	AAACCACA	UGUGGUUUA	AAGAUAAU
	2104	GGUCUCAU	CUGAUGA	X	GAA	AUCUUUAA	UUAAAGAU	AUGAGACC
	2115	UCUUCUAC	CUGAUGA	X	GAA	AGGGUCUC	GAGACCCUU	GUAGAAGA
	2118	GAGUCUUC	CUGAUGA	X	GAA	ACAAGGGU	ACCCUUGUA	GAAGACUC
10	2126	CAAUGCCU	CUGAUGA	X	GAA	AGUCUUCU	AGAAGACUC	AGGCAUUG
	2133	UUCAAUAC	CUGAUGA	X	GAA	AUGCCUGA	UCAGGCAUU	GUAUUGAA
	2136	UCCUUCAA	CUGAUGA	X	GAA	ACAAUGCC	GGCAUUGUA	UUGAAGGA
	2138	CAUCCUUC	CUGAUGA	X	GAA	AUACAAUG	CAUUGUAUU	GAAGGAUG
	2160	CGGAUAGU	CUGAUGA	X	GAA	AGGUUCCG	CGGAACCUC	ACUAUCCG
15	2164	UCUGCGGA	CUGAUGA	X	GAA	AGUGAGGU	ACCUCACUA	UCCGCAGA
	2166	ACUCUGCG	CUGAUGA	X	GAA	AUAGUGAG	CUCACUAUC	CGCAGAGU
	2196	CAGGUGUA	CUGAUGA	X	GAA	AGGCCUUC	GAAGGCCUC	UACACCUG
	2198	GGCAGGUG	CUGAUGA	X	GAA	AGAGGCCU	AGGCCUCUA	CACCUGCC
	2220	CAGCCAAG	CUGAUGA	X	GAA	ACACUGCA	UGCAGUGUU	CUUGGCUG
20	2221	ACAGCCAA	CUGAUGA	X	GAA	AACACUGC	GCAGUGUUC	UUGGCUGU
	2223	GCACAGCC	CUGAUGA	X	GAA	AGAACACU	AGUGUUCUU	GGCUGUGC
	2246	UUAUGAAA	CUGAUGA	X	GAA	AUGCCUCC	GGAGGCAUU	UUUCAUAA
	2247	AUUAUGAA	CUGAUGA	X	GAA	AAUGCCUC	GAGGCAUUU	UUCAUAAU
	2248	UAUUAUGA	CUGAUGA	X	GAA	AAAUGCCU	AGGCAUUUU	UCAUAAUA
25	2249	CUAUUAUG	CUGAUGA	X	GAA	AAAAUGCC	GGCAUUUUU	CAUAAUAG
	2250	UCUAUUAU	CUGAUGA	X	GAA	AAAAAUGC	GCAUUUUUC	AUAAUAGA
	2253	CCUUCUUA	CUGAUGA	X	GAA	AUGAAAAA	UUUUUCAUA	AUAGAAGG
	2256	GCACCUUC	CUGAUGA	X	GAA	AUUAUGAA	UUCAUAAUA	GAAGGUGC
	2282	UGAUUUCC	CUGAUGA	X	GAA	AGUUCGUC	GACGAACUU	GGAAAUCA
30	2289	AGAAUAAU	CUGAUGA	X	GAA	AUUUCCAA	UUGGAAAU	AUUAUUCU
	2292	ACUAGAAU	CUGAUGA	X	GAA	AUGAUUUC	GAAAUCAUU	AUUCUAGU
	2293	UACUAGAA	CUGAUGA	X	GAA	AAUGAUUU	AAAUCAUUA	UUCUAGUA
	2295	CCUACUAG	CUGAUGA	X	GAA	AUAAUGAU	AUCAUUAUU	CUAGUAGG

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	2296	GCCUACUA	CUGAUGA	X	GAA	AAUAAUGA	UCAUUAUUC	UAGUAGGC
	2298	GUGCCUAC	CUGAUGA	X	GAA	AGAAUAAU	AUUAUUCUA	GUAGGCAC
	2301	GUCGUGCC	CUGAUGA	X	GAA	ACUAGAAU	AUUCUAGUA	GGCACGAC
	2316	AACAUGGC	CUGAUGA	X	GAA	AUCACCGU	ACGGUGAUU	GCCAUGUU
5	2324	GCCAGAAG	CUGAUGA	X	GAA	ACAUGGCA	UGCCAUGUU	CUUCUGGC
	2325	AGCCAGAA	CUGAUGA	X	GAA	AACAUGGC	GCCAUGUUC	UUCUGGCU
	2327	GUAGCCAG	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUU	CUGGCUAC
	2328	AGUAGCCA	CUGAUGA	X	GAA	AAGAACAU	AUGUUCUUC	UGGCUACU
	2334	ACAAGAAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUA	CUUCUUGU
10	2337	AUGACAAG	CUGAUGA	X	GAA	AGUAGCCA	UGGCUACUU	CUUGUCAU
	2338	GAUGACAA	CUGAUGA	X	GAA	AAGUAGCC	GGCUACUUC	UUGUCAUC
	2340	AUGAUGAC	CUGAUGA	X	GAA	AGAAGUAG	CUACUUCUU	GUCAUCAU
	2343	AGGAUGAU	CUGAUGA	X	GAA	ACAAGAAG	CUUCUUGUC	AUCAUCCU
	2346	CCUAGGAU	CUGAUGA	X	GAA	AUGACAAG	CUUGUCAUC	AUCCUAGG
15	2349	GUCCCUAG	CUGAUGA	X	GAA	AUGAUGAC	GUCAUCAUC	CUAGGGAC
	2352	ACGGUCCC	CUGAUGA	X	GAA	AGGAUGAU	AUCAUCCUA	GGGACCGU
	2361	GCCCVCUU	CUGAUGA	X	GAA	ACGGUCCC	GGGACCGUU	AAGCGGGC
	2362	GGCCVCUU	CUGAUGA	X	GAA	AACGGUCC	GGACCGUUA	AGCGGGCC
	2396	UGGACAAG	CUGAUGA	X	GAA	AGCCUGUC	GACAGGCUA	CUUGUCCA
20	2399	CGAUGGAC	CUGAUGA	X	GAA	AGUAGCCU	AGGCUACUU	GUCCAUCG
	2402	UGACGAUG	CUGAUGA	X	GAA	ACAAGUAG	CUACUUGUC	CAUCGUCA
	2406	UCCAUGAC	CUGAUGA	X	GAA	AUGGACAA	UUGUCCAUC	GUCAUGGA
	2409	GGAUCCAU	CUGAUGA	X	GAA	ACGAUGGA	UCCAUCGUC	AUGGAUCC
	2416	UUCAUCUG	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUC	CAGAUGAA
25	2427	UCCAAUGG	CUGAUGA	X	GAA	AGUUCAUC	GAUGAACUC	CCAUUGGA
	2432	GUUCAUCC	CUGAUGA	X	GAA	AUGGGAGU	ACUCCCAUU	GGAUGAAC
	2443	UCGUUCAC	CUGAUGA	X	GAA	AUGUUCAU	AUGAACAUU	GUGAACGA
	2458	GGCAUCAU	CUGAUGA	X	GAA	AGGCAGUC	GACUGCCUU	AUGAUGCC
	2459	UGGCAUCA	CUGAUGA	X	GAA	AAGGCAGU	ACUGCCUUA	UGAUGCCA
30	2480	CUCUGGGG	CUGAUGA	X	GAA	AUUCCTAU	AUGGGAAUU	CCCCAGAG
	2481	UCUCUGGG	CUGAUGA	X	GAA	AAUUCCTA	UGGGAAUUC	CCCAGAGA
	2502	GGCUUACC	CUGAUGA	X	GAA	AGGUUCAG	CUGAACCUA	GGUAAGCC
	2506	AAGAGGCU	CUGAUGA	X	GAA	ACCUAGGU	ACCUAGGUA	AGCCUCUU

	2512	ACGGCCAA	CUGAUGA	X	GAA	AGGCUUAC	GUAAGCCUC	UUGGCCGU
	2514	CCACGGCC	CUGAUGA	X	GAA	AGAGGCUU	AAGCCUCUU	GGCCGUGG
	2528	CUUGGCCA	CUGAUGA	X	GAA	AGGCACCA	UGGUGCCUU	UGGCCAAG
	2529	UCUUGGCC	CUGAUGA	X	GAA	AAGGCACC	GGUGCCUUU	GGCCAAGA
5	2541	UCUGCUUC	CUGAUGA	X	GAA	AUCUCUUG	CAAGAGAUU	GAAGCAGA
	2555	CAAUUGCA	CUGAUGA	X	GAA	AGGCAUCU	AGAUGCCUU	UGGAAUUG
	2556	UCAAUUCC	CUGAUGA	X	GAA	AAGGCAUC	GAUGCCUUU	GGAAUUGA
	2562	GUCUUGUC	CUGAUGA	X	GAA	AUUCCAAA	UUUGGAAUU	GACAAGAC
	2578	UGUCCUGC	CUGAUGA	X	GAA	AGUUGCUG	CAGCAACUU	GCAGGACA
10	2589	UUGACUGC	CUGAUGA	X	GAA	ACUGUCCU	AGGACAGUA	GCAGUCAA
	2595	AACAUUUU	CUGAUGA	X	GAA	ACUGCUAC	GUAGCAGUC	AAA AUGUU
	2603	CUUCUUUC	CUGAUGA	X	GAA	ACAUUUUG	CAAAAUGUU	GAAAGAAG
	2632	GAGAGCUC	CUGAUGA	X	GAA	AUGCUCAC	GUGAGCAUC	GAGCUCUC
	2638	AGACAUGA	CUGAUGA	X	GAA	AGCUCGAU	AUCGAGCUC	UCAUGUCU
15	2640	UCAGACAU	CUGAUGA	X	GAA	AGAGCUCG	CGAGCUCUC	AUGUCUGA
	2645	UGAGUUCA	CUGAUGA	X	GAA	ACAUGAGA	UCUCAUGUC	UGAACUCA
	2652	AGGAUCUU	CUGAUGA	X	GAA	AGUUCAGA	UCUGAACUC	AAGAUCCU
	2658	UGAAUGAG	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAUC	CUCAUUCA
	2661	AUAUGAAU	CUGAUGA	X	GAA	AGGAUCUU	AAGAUCCUC	AUUCAUAU
20	2664	CCAAUAUG	CUGAUGA	X	GAA	AUGAGGAU	AUCCUCAUU	CAUAUUGG
	2665	ACCAAUAU	CUGAUGA	X	GAA	AAUGAGGA	UCCUCAUUC	AUAUUGGU
	2668	GUGACCAA	CUGAUGA	X	GAA	AUGAAUGA	UCAUUCAUA	UUGGUCAC
	2670	UGGUGACC	CUGAUGA	X	GAA	AUAUGAAU	AUUCAUAUU	GGUCACCA
	2674	GAGAUGGU	CUGAUGA	X	GAA	ACCAAUAU	AUAUUGGUC	ACCAUCUC
25	2680	CACAUUGA	CUGAUGA	X	GAA	AUGGUGAC	GUCACCAUC	UCA AUGUG
	2682	ACCACAUU	CUGAUGA	X	GAA	AGAUGGUG	CACCAUCUC	AAUGUGGU
	2691	AGAAGGUU	CUGAUGA	X	GAA	ACCACAUU	AAUGUGGUC	AACCUUCU
	2697	GCACCUAG	CUGAUGA	X	GAA	AGGUUGAC	GUCAACCUU	CUAGGUGC
	2698	GGCACCUA	CUGAUGA	X	GAA	AAGGUUGA	UCAACCUUC	UAGGUGCC
30	2700	CAGGCACC	CUGAUGA	X	GAA	AGAAGGUU	AACCUUCUA	GGUGCCUG
	2710	UGGCUUGG	CUGAUGA	X	GAA	ACAGGCAC	GUGCCUGUA	CCAAGCCA
	2730	AUCACCAU	CUGAUGA	X	GAA	AGUGGCCC	GGGCCACUC	AUGGUGAU
	2739	AAUUCCAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUGGAAUU

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	2747	AUUUGCAG	CUGAUGA	X	GAA	AUUCCACA	UGUGGAAUU	CUGCAAAU
	2748	AAUUUGCA	CUGAUGA	X	GAA	AAUUCCAC	GUGGAAUUC	UGCAAAUU
	2756	GGUUUCCA	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAAUU	UGGAAACC
	2757	AGGUUUC	CUGAUGA	X	GAA	AAUUUGCA	UGCAAAUUU	GGAAACCU
5	2768	GGUAAGUG	CUGAUGA	X	GAA	ACAGGUUU	AAACCUGUC	CACUUACC
	2773	CCUCAGGU	CUGAUGA	X	GAA	AGUGGACA	UGUCCACUU	ACCUGAGG
	2774	UCCUCAGG	CUGAUGA	X	GAA	AAGUGGAC	GUCCACUUA	CCUGAGGA
	2798	AGGGGACA	CUGAUGA	X	GAA	AUUCAUUU	AAAUGAAUU	UGUCCCCU
	2799	UAGGGGAC	CUGAUGA	X	GAA	AAUUCAUU	AAUGAAUUU	GUCCCCUA
10	2802	UUGUAGGG	CUGAUGA	X	GAA	ACAAAUUC	GAAUUUGUC	CCCUACAA
	2807	UGGUCUUG	CUGAUGA	X	GAA	AGGGGACA	UGUCCCCUA	CAAGACCA
	2828	CUUGACGG	CUGAUGA	X	GAA	AUCGUGCC	GGCACGAUU	CCGUCAAG
	2829	CCUUGACG	CUGAUGA	X	GAA	AAUCGUGC	GCACGAUUC	CGUCAAGG
	2833	UUUCCCUU	CUGAUGA	X	GAA	ACGGAAUC	GAUUCCGUC	AAGGGAAA
15	2846	CUCCAACG	CUGAUGA	X	GAA	AGUCUUUC	GAAAGACUA	CGUUGGAG
	2850	AUUGCUC	CUGAUGA	X	GAA	ACGUAGUC	GACUACGUU	GGAGCAAU
	2859	UCCACAGG	CUGAUGA	X	GAA	AUUGCUC	GGAGCAAUC	CCUGUGGA
	2869	CCGUUUA	CUGAUGA	X	GAA	AUCCACAG	CUGUGGAUC	UGAAACGG
	2882	UGCUGUCC	CUGAUGA	X	GAA	AGCGCCGU	ACGGCGCUU	GGACAGCA
20	2892	CUACUGGU	CUGAUGA	X	GAA	AUGCUGUC	GACAGCAUC	ACCAGUAG
	2899	GCUCUGGC	CUGAUGA	X	GAA	ACUGGUGA	UCACCAGUA	GCCAGAGC
	2909	AGCUGGCU	CUGAUGA	X	GAA	AGCUCUGG	CCAGAGCUC	AGCCAGCU
	2918	CAAAUCCA	CUGAUGA	X	GAA	AGCUGGCU	AGCCAGCUC	UGGAUUUG
	2924	CCUCCACA	CUGAUGA	X	GAA	AUCCAGAG	CUCUGGAUU	UGUGGAGG
25	2925	UCCUCCAC	CUGAUGA	X	GAA	AAUCCAGA	UCUGGAUUU	GUGGAGGA
	2939	CACUGAGG	CUGAUGA	X	GAA	ACUUCUCC	GGAGAAGUC	CCUCAGUG
	2943	ACAUCACU	CUGAUGA	X	GAA	AGGGACUU	AAGUCCCUC	AGUGAUGU
	2952	UCUUCUUC	CUGAUGA	X	GAA	ACAUCACU	AGUGAUGUA	GAAGAAGA
	2968	AUCUUCAG	CUGAUGA	X	GAA	AGCUUCCU	AGGAAGCUC	CUGAAGAU
30	2977	CUUAUACA	CUGAUGA	X	GAA	AUCUUCAG	CUGAAGAUC	UGUAUAAG
	2981	AGUCCUUA	CUGAUGA	X	GAA	ACAGAUCU	AGAUCUGUA	UAAGGACU
	2983	GAAGUCCU	CUGAUGA	X	GAA	AUACAGAU	AUCUGUAUA	AGGACUUC
	2990	AGGUCAGG	CUGAUGA	X	GAA	AGUCCUUA	UAAGGACUU	CCUGACCU

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	2991	AAGGUCAG	CUGAUGA	X	GAA	AAGUCCUU	AAGGACUUC	CUGACCUU
	2999	GAUGCUC	CUGAUGA	X	GAA	AGGUCAGG	CCUGACCUU	GGAGCAUC
	3007	ACAGAUGA	CUGAUGA	X	GAA	AUGCUGCA	UGGAGCAUC	UCAUCUGU
	3009	UACAGAU	CUGAUGA	X	GAA	AGAUGCUC	GAGCAUCUC	AUCUGUUA
5	3012	CUGUAACA	CUGAUGA	X	GAA	AUGAGAUG	CAUCUCAUC	UGUUACAG
	3016	GAAGCUGU	CUGAUGA	X	GAA	ACAGAUGA	UCAUCUGUU	ACAGCUUC
	3017	GGAAGCUG	CUGAUGA	X	GAA	AACAGAUG	CAUCUGUUA	CAGCUUCC
	3023	CCACUUGG	CUGAUGA	X	GAA	AGCUGUAA	UUACAGCUU	CCAAGUGG
	3024	GCCACUUG	CUGAUGA	X	GAA	AAGCUGUA	UACAGCUUC	CAAGUGGC
10	3034	CAUGCCCU	CUGAUGA	X	GAA	AGCCACUU	AAGUGGCUA	AGGGCAUG
	3047	AUGCCAAG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CUUGGCAU
	3048	GAUGCCAA	CUGAUGA	X	GAA	AACUCCA	AUGGAGUUC	UUGGCAUC
	3050	GCGAUGCC	CUGAUGA	X	GAA	AGAACUCC	GGAGUUCUU	GGCAUCGC
	3056	ACUUUCGC	CUGAUGA	X	GAA	AUGCCAAG	CUUGGCAUC	GCGAAAGU
15	3067	CCUGUGGA	CUGAUGA	X	GAA	ACACUUUC	GAAAGUGUA	UCCACAGG
	3069	UCCCUGUG	CUGAUGA	X	GAA	AUACACUU	AAGUGUAUC	CACAGGGA
	3094	UAAGAGGA	CUGAUGA	X	GAA	AUUUCGUG	CACGAAUA	UCCUCUUA
	3096	GAUAAGAG	CUGAUGA	X	GAA	AUAUUUCG	CGAAUAUC	CUCUUAUC
	3099	UCCGAUAA	CUGAUGA	X	GAA	AGGAUAUU	AAUAUCCUC	UUAUCGGA
20	3101	UCUCCGAU	CUGAUGA	X	GAA	AGAGGAUA	UAUCCUCUU	AUCGGAGA
	3102	UUCUCCGA	CUGAUGA	X	GAA	AAGAGGAU	AUCCUCUUA	UCGGAGAA
	3104	UCUUCUCC	CUGAUGA	X	GAA	AUAAGAGG	CCUCUUAUC	GGAGAAGA
	3120	CAGAUUUU	CUGAUGA	X	GAA	ACCACGUU	AACGUGGUU	AAAAUCUG
	3121	ACAGAUUU	CUGAUGA	X	GAA	AACCACGU	ACGUGGUUA	AAAUCUGU
25	3126	AAGUCACA	CUGAUGA	X	GAA	AUUUUAAC	GUUAAAAUC	UGUGACUU
	3134	CCAAGCCA	CUGAUGA	X	GAA	AGUCACAG	CUGUGACUU	UGGCUUGG
	3135	GCCAAGCC	CUGAUGA	X	GAA	AAGUCACA	UGUGACUUU	GGCUUGGC
	3140	CCCGGGCC	CUGAUGA	X	GAA	AGCCAAAG	CUUUGGCUU	GGCCCGGG
	3151	UUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGUA	UUUAUAAA
30	3153	UCUUUAUA	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUAUU	UAUAAAGA
	3154	AUCUUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUAUUU	AUAAAGAU
	3155	GAUCUUUA	CUGAUGA	X	GAA	AAUAUCC	GGUAUUUA	UAAAGAU
	3157	UGGAUCUU	CUGAUGA	X	GAA	AUAAUAU	AUAUUUAUA	AAGAUCCA

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	3163	AUAAUCUG	CUGAUGA	X	GAA	AUCUUUUAU	AUAAAGAUC	CAGAUUUAU
	3169	UCUGACAU	CUGAUGA	X	GAA	AUCUGGAU	AUCCAGAUU	AUGUCAGA
	3170	UUCUGACA	CUGAUGA	X	GAA	AAUCUGGA	UCCAGAUUA	UGUCAGAA
	3174	CCUUUUCU	CUGAUGA	X	GAA	ACAUAAUC	GAUUAUGUC	AGAAAAGG
5	3190	AGGGAGGC	CUGAUGA	X	GAA	AGCAUCUC	GAGAUGCUC	GCCUCCCU
	3195	UUCAAGG	CUGAUGA	X	GAA	AGGCGAGC	GCUCGCCUC	CCUUUGAA
	3199	CCAUUUCA	CUGAUGA	X	GAA	AGGGAGGC	GCCUCCCUU	UGAAAUGG
	3200	UCCAUUUC	CUGAUGA	X	GAA	AAGGGAGG	CCUCCCUUU	GAAAUGGA
	3225	CUGUCAA	CUGAUGA	X	GAA	AUUGUUUC	GAAACAAUU	UUUGACAG
10	3226	UCUGUCAA	CUGAUGA	X	GAA	AAUUGUUU	AAACAAUUU	UUGACAGA
	3227	CUCUGUCA	CUGAUGA	X	GAA	AAAUUGUU	AACAAUUUU	UGACAGAG
	3228	ACUCUGUC	CUGAUGA	X	GAA	AAAAUUGU	ACAAUUUUU	GACAGAGU
	3239	GGAUUGUG	CUGAUGA	X	GAA	ACACUCUG	CAGAGUGUA	CACAAUCC
	3246	UCACUCUG	CUGAUGA	X	GAA	AUUGUGUA	UACACAAUC	CAGAGUGA
15	3258	AAAGACCA	CUGAUGA	X	GAA	ACGUCACU	AGUGACGUC	UGGUCUUU
	3263	CACCAAAA	CUGAUGA	X	GAA	ACCAGACG	CGUCUGGUC	UUUUGGUG
	3265	AACACCAA	CUGAUGA	X	GAA	AGACCAGA	UCUGGUCUU	UUGGUGUU
	3266	AAACACCA	CUGAUGA	X	GAA	AAGACCAG	CUGGUCUUU	UGGUGUUU
	3267	AAAACACC	CUGAUGA	X	GAA	AAAGACCA	UGGUCUUUU	GGUGUUUU
20	3273	CACAGCAA	CUGAUGA	X	GAA	ACACCAA	UUUGGUGUU	UUGCUGUG
	3274	CCACAGCA	CUGAUGA	X	GAA	AACACCAA	UUGGUGUUU	UGCUGUGG
	3275	CCCACAGC	CUGAUGA	X	GAA	AAACACCA	UGGUGUUUU	GCUGUGGG
	3288	AAGGAAAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAUAU	UUUUCCUU
	3290	CUAAGGAA	CUGAUGA	X	GAA	AUAUUUCC	GGAAUAUUU	UUCCUUAG
25	3291	CCUAAGGA	CUGAUGA	X	GAA	AAUAUUUC	GAAUAUUUU	UCCUUAGG
	3292	ACCUAAGG	CUGAUGA	X	GAA	AAUAUUUU	AAUAUUUUU	CCUUAGGU
	3293	CACCUAAG	CUGAUGA	X	GAA	AAAAUAUU	AAUAUUUUC	CUUAGGUG
	3296	AAGCACCU	CUGAUGA	X	GAA	AGGAAAAU	AUUUCCUUU	AGGUGCUU
	3297	GAAGCACC	CUGAUGA	X	GAA	AAGGAAAA	UUUUCCUUA	GGUGCUUC
30	3304	AUAUGGAG	CUGAUGA	X	GAA	AGCACCUA	UAGGUGCUU	CUCCAUAU
	3305	GAUAUGGA	CUGAUGA	X	GAA	AAGCACCU	AGGUGCUUC	UCCAUAUC
	3307	AGGAUAUG	CUGAUGA	X	GAA	AGAAGCAC	GUGCUUCUC	CAUAUCCU
	3311	CCCCAGGA	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	UCCUGGGG

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	3313	UACCCAG	CUGAUGA	X	GAA	AUAUGGAG	CUCCAUAUC	CUGGGGUA
	3321	UCAAUCUU	CUGAUGA	X	GAA	ACCCAGG	CCUGGGGUA	AAGAUUGA
	3327	UCUUCAUC	CUGAUGA	X	GAA	AUCUUUAC	GUAAAGAUU	GAUGAAGA
	3338	GCCUACAA	CUGAUGA	X	GAA	AUUCUUA	UGAAGAAU	UUGUAGGC
5	3339	CGCCUACA	CUGAUGA	X	GAA	AAUUCUUC	GAAGAAU	UGUAGGCG
	3340	UCGCCUAC	CUGAUGA	X	GAA	AAAUUCUU	AAGAAUUU	GUAGGCGA
	3343	CAAUCGCC	CUGAUGA	X	GAA	ACAAAAU	AAUUUUGUA	GGCGAUUG
	3350	CUUCUUUC	CUGAUGA	X	GAA	AUCGCCUA	UAGGCGAU	GAAAGAAG
	3364	CCUCAUUC	CUGAUGA	X	GAA	AGUCCU	AAGGAACUA	GAAUGAGG
10	3382	UGUAGUAU	CUGAUGA	X	GAA	AUCAGGGG	CCCCUGAU	AUACUACA
	3383	GUGUAGUA	CUGAUGA	X	GAA	AAUCAGGG	CCCUGAUUA	UACUACAC
	3385	UGGUGUAG	CUGAUGA	X	GAA	AUAAUCAG	CUGAUUAUA	CUACACCA
	3388	UUCUGGUG	CUGAUGA	X	GAA	AGUAUAAU	AUUAUACUA	CACCAGAA
	3401	UGGUCUGG	CUGAUGA	X	GAA	ACAUUUCU	AGAAAUGUA	CCAGACCA
15	3439	GGGUCUCU	CUGAUGA	X	GAA	ACUGGGCU	AGCCCAGUC	AGAGACCC
	3452	ACUCUGAA	CUGAUGA	X	GAA	ACGUGGGU	ACCCACGUU	UUCAGAGU
	3453	AACUCUGA	CUGAUGA	X	GAA	AACGUGGG	CCCACGUUU	UCAGAGUU
	3454	CAACUCUG	CUGAUGA	X	GAA	AAACGUGG	CCACGUUUU	CAGAGUUG
	3455	CCAACUCU	CUGAUGA	X	GAA	AAAACGUG	CACGUUUUC	AGAGUUGG
20	3461	GUUCCACC	CUGAUGA	X	GAA	ACUCUGAA	UUCAGAGUU	GGUGGAAC
	3472	AUUUCCCA	CUGAUGA	X	GAA	AUGUCCA	UGGAACAUU	UGGGAAAU
	3473	GAUUUCCC	CUGAUGA	X	GAA	AAUGUCC	GGAACAUUU	GGGAAAU
	3481	UUGCAAGA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAU	UCUUGCAA
	3483	GCUUGCAA	CUGAUGA	X	GAA	AGAUUCC	GGAAAUUC	UUGCAAGC
25	3485	UAGCUUGC	CUGAUGA	X	GAA	AGAGAUUU	AAAUUCUU	GCAAGCUA
	3493	CUGAGCAU	CUGAUGA	X	GAA	AGCUUGCA	UGCAAGCUA	AUGCUCAG
	3499	AUCCUGCU	CUGAUGA	X	GAA	AGCAUUG	CUAAUGCUC	AGCAGGAU
	3518	GAACAAUG	CUGAUGA	X	GAA	AGUCUUUG	CAAAGACUA	CAUUGUUC
	3522	GGAAGAAC	CUGAUGA	X	GAA	AUGUAGUC	GACUACAUU	GUUCUUC
30	3525	AUCGGAAG	CUGAUGA	X	GAA	ACAAUGUA	UACAUUGUU	CUUCCGAU
	3526	UAUCGGAA	CUGAUGA	X	GAA	AACAAUGU	ACAUUGUUC	UUCCGAUA
	3528	GAUAUCGG	CUGAUGA	X	GAA	AGAACAAU	AUUGUUCUU	CCGAUAUC
	3529	UGAUAUCG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUC	CGAUAUCA

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	3534	GUCUCUGA	CUGAUGA	X	GAA	AUCGGAAG	CUUCCGAUA	UCAGAGAC
	3536	AAGUCUCU	CUGAUGA	X	GAA	AUAUCGGA	UCCGAUAUC	AGAGACUU
	3544	CAUGCUCU	CUGAUGA	X	GAA	AGUCUCUG	CAGAGACUU	UGAGCAUG
	3545	CCAUGCUC	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUU	GAGCAUGG
5	3562	GAGUCCAG	CUGAUGA	X	GAA	AUCCUCUU	AAGAGGAUU	CUGGACUC
	3563	AGAGUCCA	CUGAUGA	X	GAA	AAUCCUCU	AGAGGAUUC	UGGACUCU
	3570	GGCAGAGA	CUGAUGA	X	GAA	AGUCCAGA	UCUGGACUC	UCUCUGCC
	3572	UAGGCAGA	CUGAUGA	X	GAA	AGAGUCCA	UGGACUCUC	UCUGCCUA
	3574	GGUAGGCA	CUGAUGA	X	GAA	AGAGAGUC	GACUCUCUC	UGCCUACC
10	3580	AGGUGAGG	CUGAUGA	X	GAA	AGGCAGAG	CUCUGCCUA	CCUCACCU
	3584	AAACAGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCUGUUU
	3591	AUACAGGA	CUGAUGA	X	GAA	ACAGGUGA	UCACCUGUU	UCCUGUAU
	3592	CAUACAGG	CUGAUGA	X	GAA	AACAGGUG	CACCUGUUU	CCUGUAUG
	3593	CCAUACAG	CUGAUGA	X	GAA	AAACAGGU	ACCUGUUUC	CUGUAUGG
15	3598	CUCCUCCA	CUGAUGA	X	GAA	ACAGGAAA	UUUCCUGUA	UGGAGGAG
	3615	GGGUCACA	CUGAUGA	X	GAA	ACUUCCUC	GAGGAAGUA	UGUGACCC
	3629	CAUAAUGG	CUGAUGA	X	GAA	AUUUGGGG	CCCCAAAUU	CAUUAUG
	3630	UCAUAAUG	CUGAUGA	X	GAA	AAUUUGGG	CCCCAAUUC	CAUUAUGA
	3634	GUUGUCAU	CUGAUGA	X	GAA	AUGGAAUU	AAUUCCAUU	AUGACAAC
20	3635	UGUUGUCA	CUGAUGA	X	GAA	AAUGGAAU	AUUCCAUUA	UGACAACA
	3654	UACUGACU	CUGAUGA	X	GAA	AUUCUGC	GCAGGAAUC	AGUCAGUA
	3658	CAGAUACU	CUGAUGA	X	GAA	ACUGAUUC	GAAUCAGUC	AGUAUCUG
	3662	UCUGCAGA	CUGAUGA	X	GAA	ACUGACUG	CAGUCAGUA	UCUGCAGA
	3664	GUUCUGCA	CUGAUGA	X	GAA	AUACUGAC	GUCAGUAUC	UGCAGAAC
25	3676	CUUUCGCU	CUGAUGA	X	GAA	ACUGUUCU	AGAACAGUA	AGCGAAAG
	3702	AAUGUUUU	CUGAUGA	X	GAA	ACACUCAC	GUGAGUGUA	AAAACAUU
	3710	UAUCUUCA	CUGAUGA	X	GAA	AUGUUUUU	AAAACAUU	UGAAGUAU
	3711	AUAUCUUC	CUGAUGA	X	GAA	AAUGUUUU	AAAACAUUU	GAAGAUUU
	3718	UAACGGGA	CUGAUGA	X	GAA	AUCUUCAA	UUGAAGUAU	UCCCGUUA
30	3720	UCUAAACG	CUGAUGA	X	GAA	AUAUCUUC	GAAGAUUUC	CCGUUAGA
	3725	GUUCUUCU	CUGAUGA	X	GAA	ACGGGAUA	UAUCCCGUU	AGAAGAAC
	3726	GGUUCUUC	CUGAUGA	X	GAA	AACGGGAU	AUCCCGUUA	GAAGAACC
	3741	AUUACUUU	CUGAUGA	X	GAA	ACUUCUGG	CCAGAAGUA	AAAGUAAU



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	3747	UCUGGGAU	CUGAUGA	X	GAA	ACUUUUAC	GUAAAAGUA	AUCCCAGA
	3750	UCAUCUGG	CUGAUGA	X	GAA	AUUACUUU	AAAGUAAUC	CCAGAUGA
	3778	AAGAACCA	CUGAUGA	X	GAA	ACCACUGU	ACAGUGGUA	UGGUUCUU
	3783	GAGGCAAG	CUGAUGA	X	GAA	ACCAUACC	GGUAUGGUU	CUUGCCUC
5	3784	UGAGGCAA	CUGAUGA	X	GAA	AACCAUAC	GUAUGGUUC	UUGCCUCA
	3786	UCUGAGGC	CUGAUGA	X	GAA	AGAACCAU	AUGGUUCUU	GCCUCAGA
	3791	GCUCUUCU	CUGAUGA	X	GAA	AGGCAAGA	UCUUGCCUC	AGAAGAGC
	3808	GUCUUCCA	CUGAUGA	X	GAA	AGUUUUA	UGAAAACUU	UGGAAGAC
	3809	UGUCUUCU	CUGAUGA	X	GAA	AAGUUUUC	GAAAACUUU	GGAAGACA
10	3827	AUGGAGAU	CUGAUGA	X	GAA	AUUUGGUU	AACCAAUUU	AUCUCCAUC
	3828	GAUGGAGA	CUGAUGA	X	GAA	AAUUUGGU	ACCAAUUUA	UCUCCAUC
	3830	AAGAUGGA	CUGAUGA	X	GAA	AUAAUUUG	CAAUUUAUC	UCCAUCUU
	3832	AAAAGAUG	CUGAUGA	X	GAA	AGAUAAUU	AAUUUAUCUC	CAUCUUUU
	3836	CACCAAAA	CUGAUGA	X	GAA	AUGGAGAU	AUCUCCAUC	UUUUGGUG
15	3838	UCCACCAA	CUGAUGA	X	GAA	AGAUGGAG	CUCCAUCUU	UUGGUGGA
	3839	UCCACCA	CUGAUGA	X	GAA	AAGAUGGA	UCCAUCUUU	UGGUGGAA
	3840	AUCCACC	CUGAUGA	X	GAA	AAAGAUGG	CCAUCUUUU	GGUGGAAU
	3872	AUGCCACA	CUGAUGA	X	GAA	ACUCCUG	CAGGGAGUC	UGUGGCAU
	3881	AGCCUUA	CUGAUGA	X	GAA	AUGCCACA	UGUGGCAUC	UGAAGGCU
20	3890	UCUGGUUU	CUGAUGA	X	GAA	AGCCUUA	UGAAGGCUC	AAACCAGA
	3908	CGGACUGG	CUGAUGA	X	GAA	AGCCGCUU	AAGCGGCUA	CCAGUCCG
	3914	GAUAUCCG	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUC	CGGAUAUC
	3920	CGGAGUGA	CUGAUGA	X	GAA	AUCCGGAC	GUCCGGAUA	UCACUCCG
	3922	AUCGGAGU	CUGAUGA	X	GAA	AUAUCCGG	CCGGAUAUC	ACUCCGAU
25	3926	UGUCAUCG	CUGAUGA	X	GAA	AGUGAUAU	AUAUCACUC	CGAUGACA
	3950	CACUGGAG	CUGAUGA	X	GAA	ACACGGUG	CACCGUGUA	CUCCAGUG
	3953	CCUCACUG	CUGAUGA	X	GAA	AGUACACG	CGUGUACUC	CAGUGAGG
	3972	AGCUUUAA	CUGAUGA	X	GAA	AGUUCUGC	GCAGAACUU	UUAAAGCU
	3973	CAGCUUUA	CUGAUGA	X	GAA	AAGUUCUG	CAGAACUUU	UAAAGCUG
30	3974	UCAGCUUU	CUGAUGA	X	GAA	AAAGUUCU	AGAACUUUU	AAAGCUGA
	3975	AUCAGCUU	CUGAUGA	X	GAA	AAAAGUUC	GAACUUUUU	AAGCUGAU
	3984	CCAAUCUC	CUGAUGA	X	GAA	AUCAGCUU	AAGCUGAUA	GAGAUUGG
	3990	UGCACUCC	CUGAUGA	X	GAA	AUCUCUUA	AUAGAGAUU	GGAGUGCA

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	4006	GGCUGUGC	CUGAUGA	X	GAA	ACCGGUUU	AAACCGGUA	GCACAGCC
	4020	GGCUGGAG	CUGAUGA	X	GAA	AUCUGGGC	GCCCAGAUU	CUCCAGCC
	4021	AGGCUGGA	CUGAUGA	X	GAA	AAUCUGGG	CCCAGAUUC	UCCAGCCU
	4023	UCAGGCUG	CUGAUGA	X	GAA	AGAAUCUG	CAGAUUCUC	CAGCCUGA
5	4052	CAGGAGGA	CUGAUGA	X	GAA	AGCUCAGU	ACUGAGCUC	UCCUCCUG
	4054	AACAGGAG	CUGAUGA	X	GAA	AGAGCUCA	UGAGCUCUC	CUCCUGUU
	4057	UUAACAG	CUGAUGA	X	GAA	AGGAGAGC	GCUCUCCUC	CUGUUUAA
	4062	UCCUUUUA	CUGAUGA	X	GAA	ACAGGAGG	CCUCCUGUU	UAAAAGGA
	4063	UUCCUUUU	CUGAUGA	X	GAA	AACAGGAG	CUCCUGUUU	AAAAGGAA
10	4064	CUUCCUUU	CUGAUGA	X	GAA	AAACAGGA	UCCUGUUUA	AAAGGAAG
	4076	GGGGUGUG	CUGAUGA	X	GAA	AUGCUUCC	GGAAGCAUC	CACACCCC
	4089	AUGUCCGG	CUGAUGA	X	GAA	AGUUGGGG	CCCCAACUC	CCGGACAU
	4098	UCUCAUGU	CUGAUGA	X	GAA	AUGUCCGG	CCGGACAUC	ACAUGAGA
	4110	UCUGAGCA	CUGAUGA	X	GAA	ACCUCUCA	UGAGAGGUC	UGCUCAGA
15	4115	CAAAAUCU	CUGAUGA	X	GAA	AGCAGACC	GGUCUGCUC	AGAUUUUG
	4120	CACUUCAA	CUGAUGA	X	GAA	AUCUGAGC	GCUCAGAUU	UUGAAGUG
	4121	ACACUUCA	CUGAUGA	X	GAA	AAUCUGAG	CUCAGAUUU	UGAAGUGU
	4122	AACACUUC	CUGAUGA	X	GAA	AAAUCUGA	UCAGAUUUU	GAAGUGUU
	4130	GAAAGAAC	CUGAUGA	X	GAA	ACACUUCA	UGAAGUGUU	GUUCUUUC
20	4133	GUGGAAAG	CUGAUGA	X	GAA	ACAACACU	AGUGUUGUU	CUUCCAC
	4134	GGUGGAAA	CUGAUGA	X	GAA	AACAACAC	GUGUUGUUC	UUUCCACC
	4136	CUGGUGGA	CUGAUGA	X	GAA	AGAACAAC	GUUGUUCUU	UCCACCAG
	4137	GCUGGUGG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUU	CCACCAGC
	4138	UGCUGGUG	CUGAUGA	X	GAA	AAAGAACA	UGUUCUUUC	CACCAGCA
25	4153	AAUGCGGC	CUGAUGA	X	GAA	ACUCCUG	CAGGAAGUA	GCCGCAUU
	4161	GAAAAUCA	CUGAUGA	X	GAA	AUGCGGCU	AGCCGCAUU	UGAUUUUC
	4162	UGAAAAUC	CUGAUGA	X	GAA	AAUGCGGC	GCCGCAUUU	GAUUUUA
	4166	GAAAUGAA	CUGAUGA	X	GAA	AUCAAAUG	CAUUUGAUU	UUCAUUUC
	4167	CGAAAUGA	CUGAUGA	X	GAA	AAUCAAAU	AUUUGAUUU	UCAUUUCG
30	4168	UCGAAAUG	CUGAUGA	X	GAA	AAAUCAA	UUUGAUUUU	CAUUUCGA
	4169	GUCGAAAU	CUGAUGA	X	GAA	AAAAUCA	UUGAUUUUC	AUUUCGAC
	4172	GUUGUCGA	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAUU	UCGACAAC
	4173	UGUUGUCG	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUU	CGACAACA

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4174	CUGUUGUC	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUC	GACAACAG
4194	UGCAGUCC	CUGAUGA	X	GAA	AGGUCCUU	AAGGACCUC	GGACUGCA
4214	GCCUAGAA	CUGAUGA	X	GAA	AGCUGGCU	AGCCAGCUC	UUCUAGGC
4216	AAGCCUAG	CUGAUGA	X	GAA	AGAGCUGG	CCAGCUCUU	CUAGGCUU
5 4217	CAAGCCUA	CUGAUGA	X	GAA	AAGAGCUG	CAGCUCUUC	UAGGCUUG
4219	CACAAGCC	CUGAUGA	X	GAA	AGAAGAGC	GCUCUUCUA	GGCUUGUG

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be  $\geq 2$  base-pairs.

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Table V: Human KDR VEGF Receptor-Hairpin Ribozyme and Substrate Sequences

nt.	Position	Hairpin Ribozyme Sequence	Substrate
	11	CGACGGCC AGAA GCACCU ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	AGGUGCU GCU GGCCGUCG
5	18	CACAGGGC AGAA GCCAGC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	GCUGGCC GUC GCCCUGUG
	51	CCCACAGA AGAA GCGCGG ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	CCGGGCC GCC UCUGUGGG
	86	UGAGCCUG AGAA GAUCAA ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	UUGAUCU GCC CAGGCCUA
	318	GAGGCCAA AGAA GUUUCC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	GGAAACU GAC UUGGCCUC
	358	AAUUGGAG AGAA GUAAUC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	GAUUACA GAU CUCCAUUU
10	510	CUGUUACC AGAA GGAACA ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	UGUUCU GAU GGUAAACAG
	623	ACAUAAUA AGAA GGUAAC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	GUUACCA GUC UAUUAUGU
	683	UUCCAUGA AGAA GACUCA ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	UGAGUCC GUC UCAUGGAA
	705	UUUUCUCC AGAA GAUAGU ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	ACUAUCU GUU GGAGAAAA
	833	CACUCCCA AGAA GGGUUU ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	AAACCCA GUC UGGGAGUG
15	932	UCUUGGUC AGAA GCCCAC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	GUGGGCU GAU GACCAAGA
	1142	CCAUAAUC AGAA GUACAU ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	AUGUACU GAC GAUUAUGG
	1259	UCUCACCA AGAA GGGGUG ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	CACCCCA GAU UGGUGAGA
	1332	AUGGCAUA AGAA GUACAU ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA	AUGUACG GUC UAUGCCAU

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1376 CUUCCUCC AGAA GCCAAU ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA AUUGGCA GUU GGAGGAAG  
 1413 GUCACUGA AGAA GCUUGG ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA CCAAGCU GUC UCAGUGAC  
 1569 UUGUACAA AGAA GACACA ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA UGUGUCA GCU UUGUACAA  
 1673 GCUCAGUG AGAA GCAUGU ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA ACAUGCA GCC CACUGAGC  
 5 1717 AAACGUAG AGAA GUCUGC ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA GCAGACA GAU CUACGUUU  
 1760 UUGGCAGA AGAA GUGGGC ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA GCCACA GCC UCUGCCAA  
 1797 UUCUUGCA AGAA GGUGUG ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA CACACCU GUU UGCAAGAA  
 1918 UUGAGCAA AGAA GACAUU ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA UAUUGUC GCC UUGCUCAA  
 1967 GGACUGUG AGAA GCCUGA ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA UCAGGCA GCU CACAGUCC  
 10 1974 CGCUCUAG AGAA GUGAGC ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA GCUCACA GUC CUAGAGCG  
 2021 UACUUGUC AGAA GAUUCU ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA AGAAUCA GAC GACAAGUA  
 2084 ACCACAUG AGAA GUGGAG ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA CUCCACA GAU CAUGUGGU  
 2418 GGGAGUUC AGAA GGAUCC ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA GGAUCCA GAU GAACUCCC  
 2453 CAUCAUA AGAA GUCGUU ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA AACGACU GCC UUAUGAUG  
 15 2492 CUAGGUUC AGAA GGUCUC ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA GAGACCG GCU GAACCUAG  
 2547 CCAAAGGC AGAA GCUUCA ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA UGAAGCA GAU GCCUUUGG  
 2765 GGUAGUG AGAA GGUUUC ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA GAAACCU GUC CACUUAAC  
 2914 AAUCCAG AGAA GGCUGA ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA UCAGCCA GCU CUGGAUUU  
 2993 GCUCCAAG AGAA GGAAGU ACCAGAGAAACACACGUGUGGUACAUAUACCUUGGUA ACUCCU GAC CUUGGAGC

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3019	CACUUGGA	AGAA	GUAACA	ACCAGAGAAAACACACG	UGUGGUA	CAUUACCUGGUA	UGUUACA	GCU	UCCAAGUG
3165	CUGACAU	AGAA	GGAUCU	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	AGAUCCA	GAU	UAUGUCAG
3378	GUAGUAU	AGAA	GGGGCC	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	GGCCCCU	GAU	UAUACUAC
3404	CCAGCAUG	AGAA	GGUACA	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	UGUACCA	GAC	CAUGCUGG
5 3418	CCCGUGCC	AGAA	GUCCAG	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	CUGGACU	GCU	GGCACGGG
3575	GUGAGGUA	AGAA	GAGAGA	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	UCUCUCU	GCC	UACCUCAC
3588	AUACAGGA	AGAA	GGUGAG	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	CUCACCU	GUU	UCCUGUAU
3689	CACUCACA	AGAA	GGCUCU	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	AGAGCCG	GCC	UGUGAGUG
3753	UGGUUGUC	AGAA	GGGAUU	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	AAUCCCA	GAU	GACAACCA
10 3764	CACUGUCC	AGAA	GGUUGU	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	ACAACCA	GAC	GGACAGUG
3911	GAUAUCCG	AGAA	GGUAGC	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	GCUACCA	GUC	CGGAUAUC
3927	UCUGUGUC	AGAA	GAGUGA	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	UCACUCC	GAU	GACACAGA
4011	AGAAUCUG	AGAA	GUGCUA	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	UAGCACA	GCC	CAGAUUCU
4016	GCUGGAGA	AGAA	GGGCUG	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	CAGCCCA	GAU	UCUCCAGC
15 4025	CCGUGUCA	AGAA	GGAGAA	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	UUCUCCA	GCC	UGACACGG
4059	UCCUUUUA	AGAA	GGAGGA	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	UCCUCCU	GUU	UAAAAGGA
4111	AAAAUCUG	AGAA	GACCUC	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	GAGGUCU	GCU	CAGAUUUU
4116	ACUUCAAA	AGAA	GAGCAG	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	CUGCUCU	GAU	UUUGAAGU
4195	UCCCUGCA	AGAA	GAGGUC	ACCAGAGAAAACACG	UGUGGUA	CAUUACCUGGUA	GACCUCG	GAC	UGCAGGGA

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4210 CCUAGAAG AGAA GGCUCC ACCAGAGAAAACACACGCUUGUGGUACAUUACCUGGUA GGAGCCA GCU CUUCUAGG

Table VI: Mouse *flk-1* VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

nt. Posi tion	HH Ribozyme Sequence					Substrate	
5	13	CCGUACCC	CUGAUGA	X	GAA AUUCGCCC	GGGCGAAUU	GGGUACGG
	18	GGGUCCCG	CUGAUGA	X	GAA ACCCAAUU	AAUUGGGUA	CGGGACCC
	31	UCGACCUC	CUGAUGA	X	GAA AGGGGGGU	ACCCCCCUC	GAGGUCGA
	37	AUACCGUC	CUGAUGA	X	GAA ACCUCGAG	CUCGAGGUC	GACGGUAU
10	44	CUUAUCGA	CUGAUGA	X	GAA ACCGUCGA	UCGACGGUA	UCGAUAAG
	46	AGCUUAUC	CUGAUGA	X	GAA AUACCGUC	GACGGUAUC	GAUAAGCU
	50	AUCAAGCU	CUGAUGA	X	GAA AUCGAUAC	GUAUCGAUA	AGCUUGAU
	55	UCGAUAUC	CUGAUGA	X	GAA AGCUUAUC	GAUAAGCUU	GAUAUCGA
	59	GAAUUCGA	CUGAUGA	X	GAA AUCAAGCU	AGCUUGAUA	UCGAAUUC
15	61	CCGAAUUC	CUGAUGA	X	GAA AUAUCAAG	CUUGAUAUC	GAAUUCGG
	66	UGGGCCCG	CUGAUGA	X	GAA AUUCGAUA	UAUCGAAUU	CGGGCCCA
	67	CUGGGCCC	CUGAUGA	X	GAA AAUUCGAU	AUCGAAUUC	GGGCCCAG
	83	GGCUGCGG	CUGAUGA	X	GAA ACACAGUC	GACUGUGUC	CCGCAGCC
	97	AGCCAGGU	CUGAUGA	X	GAA AUCCCGGC	GCCGGGAUA	ACCUGGCU
20	114	GUCCGCGG	CUGAUGA	X	GAA AUCGGGUC	GACCCGAUU	CCGCGGAC
	115	UGUCCGCG	CUGAUGA	X	GAA AAUCGGGU	ACCCGAUUC	CGCGGACA
	169	ACCGGGGA	CUGAUGA	X	GAA AGCGCGGG	CCCGCGCUC	UCCCCGGU
	171	AGACCGGG	CUGAUGA	X	GAA AGAGCGCG	CGCGCUCUC	CCCGGUCU
	178	CAGCGCAA	CUGAUGA	X	GAA ACCGGGGA	UCCCCGGUC	UUGCGCUG
25	180	CGCAGCGC	CUGAUGA	X	GAA AGACCGGG	CCCGGUCUU	GCGCUGCG
	197	AGAGGCGG	CUGAUGA	X	GAA AUGGCCCC	GGGGCCAUA	CCGCCUCU
	204	AAGUCACA	CUGAUGA	X	GAA AGGCGGUA	UACCGCCUC	UGUGACUU
	212	CCGCAAAG	CUGAUGA	X	GAA AGUCACAG	CUGUGACUU	CUUUGCGG
	213	CCCGCAAA	CUGAUGA	X	GAA AAGUCACA	UGUGACUUC	UUUGCGGG
30	215	GGCCCGCA	CUGAUGA	X	GAA AGAAGUCA	UGACUUCUU	UGCGGGCC



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216 UGGCCCGC CUGAUGA X GAA AAGAAGUC GACUUCUUU GCGGGCCA  
241 CAGGCACA CUGAUGA X GAA ACUCCUUC GAAGGAGUC UGUGCCUG  
262 UGGGCACA CUGAUGA X GAA AGCCCAGU ACUGGGCUC UGUGCCCA  
306 GCGACAGC CUGAUGA X GAA AGCAGCGC GCGCUGCUA GCUGUCGC  
5 312 CACAGAGC CUGAUGA X GAA ACAGCUAG CUAGCUGUC GCUCUGUG  
316 GAACCACA CUGAUGA X GAA AGCGACAG CUGUCGCUC UGUGGUUC  
323 CCACGCAG CUGAUGA X GAA ACCACAGA UCUGUGGUU CUGCGUGG  
324 UCCACGCA CUGAUGA X GAA AACCACAG CUGUGGUUC UGCGUGGA  
347 AACCCACA CUGAUGA X GAA AGGCGGCU AGCCGCCUC UGUGGGUU  
10 355 GCCAGUCA CUGAUGA X GAA ACCCACAG CUGUGGGUU UGACUGGC  
356 CGCCAGUC CUGAUGA X GAA AACCCACA UGUGGGUUU GACUGGCG  
367 AUGGAGAA CUGAUGA X GAA AUCGCCAG CUGGCGAUU UUCUCCA  
368 GAUGGAGA CUGAUGA X GAA AAUCGCCA UGGCGAUUU UCUCCAUC  
369 GGAUGGAG CUGAUGA X GAA AAAUCGCC GGCGAUUUU CUCCAUC  
15 370 GGAUGGA CUGAUGA X GAA AAAAUCGC GCGAUUUUC UCCAUCCC  
372 GGGGGAUG CUGAUGA X GAA AGAAAAUC GAUUUUCUC CAUCCCCC  
376 CUUGGGGG CUGAUGA X GAA AUGGAGAA UUCUCCAUC CCCCCAAG  
387 UGUGUGCU CUGAUGA X GAA AGCUUGGG CCCAAGCUC AGCACACA  
405 AUUGUCAG CUGAUGA X GAA AUGUCUUU AAAGACAU CUGACAAU  
20 414 UUGCCAA CUGAUGA X GAA AUUGUCAG CUGACAAU UUGGCAA  
415 AUUGCCA CUGAUGA X GAA AAUUGUCA UGACAAUU UGGCAAU  
416 UAUUGCC CUGAUGA X GAA AAUUGUC GACAAUUU GGCAAUA  
424 AAGGUUG CUGAUGA X GAA AUUGCCA UGGCAAUA CAACCCU  
432 GUAAUCUG CUGAUGA X GAA AGGUUGU ACAACCCU CAGAUUAC  
25 433 AGUAAUCU CUGAUGA X GAA AAGGUUG CAACCCUUC AGAUUACU  
438 CUGCAAGU CUGAUGA X GAA AUCUGAAG CUUCAGAU ACUUGCAG  
439 CCUGCAAG CUGAUGA X GAA AAUCUGAA UUCAGAUU CUUGCAGG  
442 UCCCCUGC CUGAUGA X GAA AGUAAUCU AGAUUACU GCAGGGGA  
471 UUGGGCCA CUGAUGA X GAA AGCCAGUC GACUGGCUU UGGCCCAA  
30 472 AUUGGGCC CUGAUGA X GAA AAGCCAGU ACUGGCUU GGCCCAA

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	484	AUCACGCU	CUGAUGA	X	GAA	AGCAUUGG	CCAAUGCUC	AGCGUGAU
	493	UUCCUCAG	CUGAUGA	X	GAA	AUCACGCU	AGCGUGAUU	CUGAGGAA
	494	UUUCCUCA	CUGAUGA	X	GAA	AAUCACGC	GCGUGAUUC	UGAGGAAA
	507	GUCACCAA	CUGAUGA	X	GAA	ACCCUUUC	GAAAGGGUA	UUGGUGAC
5	509	CAGUCACC	CUGAUGA	X	GAA	AUACCCUU	AAGGGUAUU	GGUGACUG
	538	GCAGAAGA	CUGAUGA	X	GAA	ACUGUCAC	GUGACAGUA	UCUUCUGC
	540	UUGCAGAA	CUGAUGA	X	GAA	AUACUGUC	GACAGUAUC	UUCUGCAA
	542	UUUUGCAG	CUGAUGA	X	GAA	AGAUACUG	CAGUAUCUU	CUGCAAAA
	543	GUUUUGCA	CUGAUGA	X	GAA	AAGAUACU	AGUAUCUUC	UGCAAAAC
10	555	GGAAUGGU	CUGAUGA	X	GAA	AGUGUUUU	AAAACACUC	ACCAUUCC
	561	ACCCUGGG	CUGAUGA	X	GAA	AUGGUGAG	CUCACCAUU	CCCAGGGU
	562	CACCCUGG	CUGAUGA	X	GAA	AAUGGUGA	UCACCAUUC	CCAGGGUG
	573	UCAUUUCC	CUGAUGA	X	GAA	ACCACCCU	AGGGUGGUU	GGAAAUGA
	583	GGCUCCAG	CUGAUGA	X	GAA	AUCAUUUC	GAAAUGAUA	CUGGAGCC
15	593	AGCACUUG	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	CAAGUGCU
	602	CCCGGUAC	CUGAUGA	X	GAA	AGCACUUG	CAAGUGCUC	GUACCGGG
	605	CGUCCCGG	CUGAUGA	X	GAA	ACGAGCAC	GUGCUCGUA	CCGGGACG
	615	GCUAUGUC	CUGAUGA	X	GAA	ACGUCCCC	CGGGACGUC	GACAUAGC
	621	GUGGAGGC	CUGAUGA	X	GAA	AUGUCGAC	GUCGACAU	GCCUCCAC
20	626	AAACAGUG	CUGAUGA	X	GAA	AGGCUAUG	CAUAGCCUC	CACUGUUU
	633	UAGACAU	CUGAUGA	X	GAA	ACAGUGGA	UCCACUGUU	UAUGUCUA
	634	AUAGACAU	CUGAUGA	X	GAA	AACAGUGG	CCACUGUUU	AUGUCUAU
	635	CAUAGACA	CUGAUGA	X	GAA	AAACAGUG	CACUGUUUA	UGUCUAUG
	639	CGAACAU	CUGAUGA	X	GAA	ACAUAAAC	GUUUAUGUC	UAUGUUCG
25	641	CUCGAACA	CUGAUGA	X	GAA	AGACAUAA	UUAUGUCUA	UGUUCGAG
	645	UAAUCUCG	CUGAUGA	X	GAA	ACAUAGAC	GUCUAUGUU	CGAGAUUA
	646	GUAAUCUC	CUGAUGA	X	GAA	AACAUAGA	UCUAUGUUC	GAGAUUAC
	652	UGAUCUGU	CUGAUGA	X	GAA	AUCUCGAA	UUCGAGAUU	ACAGAUCA
	653	GUGAUCUG	CUGAUGA	X	GAA	AAUCUCGA	UCGAGAUUA	CAGAUAC
30	659	UGAAUGGU	CUGAUGA	X	GAA	AUCUGUAA	UUACAGAU	ACCAUUCA

	665	AGGCGAUG	CUGAUGA	X	GAA	AUGGUGAU	AUCACCAUU	CAUCGCCU
	666	GAGGCGAU	CUGAUGA	X	GAA	AAUGGUGA	UCACCAUUC	AUCGCCUC
	669	ACAGAGGC	CUGAUGA	X	GAA	AUGAAUGG	CCAUUCAUC	GCCUCUGU
	674	CACUGACA	CUGAUGA	X	GAA	AGGCGAUG	CAUCGCCUC	UGUCAGUG
5	678	UGGUCACU	CUGAUGA	X	GAA	ACAGAGGC	GCCUCUGUC	AGUGACCA
	696	AUGUACAC	CUGAUGA	X	GAA	AUGCCAUG	CAUGGCAUC	GUGUACAU
	701	CGGUGAUG	CUGAUGA	X	GAA	ACACGAUG	CAUCGUGUA	CAUCACCG
	705	UUCUCGGU	CUGAUGA	X	GAA	AUGUACAC	GUGUACAUC	ACCGAGAA
	735	CGGCAGGG	CUGAUGA	X	GAA	AUCACCAC	GUGGUGAUC	CCCUGCCG
10	749	UUGAAAUC	CUGAUGA	X	GAA	ACCCUCGG	CCGAGGGUC	GAUUUCAA
	753	AGGUUUGA	CUGAUGA	X	GAA	AUCGACCC	GGGUCGAUU	UCAAACCU
	754	GAGGUUUG	CUGAUGA	X	GAA	AAUCGACC	GGUCGAUUU	CAAACCUC
	755	UGAGGUUU	CUGAUGA	X	GAA	AAAUCGAC	GUCGAUUUC	AAACCUCA
	762	GACACAUU	CUGAUGA	X	GAA	AGGUUUGA	UCAAACCUC	AAUGUGUC
15	770	CGCAAAGA	CUGAUGA	X	GAA	ACACAUUG	CAAUGUGUC	UCUUUGCG
	772	AGCGCAAA	CUGAUGA	X	GAA	AGACACAU	AUGUGUCUC	UUUGCGCU
	774	CUAGCGCA	CUGAUGA	X	GAA	AGAGACAC	GUGUCUCUU	UGCGCUAG
	775	CCUAGCGC	CUGAUGA	X	GAA	AAGAGACA	UGUCUCUUU	GCGCUAGG
	781	UGGAUACC	CUGAUGA	X	GAA	AGCGCAAA	UUUGCGCUA	GGUAUCCA
20	785	UUUCUGGA	CUGAUGA	X	GAA	ACCUAGCG	CGCUAGGUA	UCCAGAAA
	787	CUUUUCUG	CUGAUGA	X	GAA	AUACCUAG	CUAGGUAUC	CAGAAAAG
	800	CCGGAACA	CUGAUGA	X	GAA	AUCUCUUU	AAAGAGAUU	UGUCCGGG
	801	UCCGGAAC	CUGAUGA	X	GAA	AAUCUCUU	AAGAGAUUU	GUUCCGGA
	804	CCAUCCGG	CUGAUGA	X	GAA	ACAAAUCU	AGAUUUGUU	CCGGAUGG
25	805	UCCAUCCG	CUGAUGA	X	GAA	AACAAAUC	GAUUUGUUC	CGGAUGGA
	822	UCCCAGGA	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU	UCCUGGGA
	823	GUCCCAGG	CUGAUGA	X	GAA	AAUUCUGU	ACAGAAUUU	CCUGGGAC
	824	UGUCCCAG	CUGAUGA	X	GAA	AAAUUCUG	CAGAAUUUC	CUGGGACA
	840	GUAAAGCC	CUGAUGA	X	GAA	AUCUCGCU	AGCGAGAUU	GGCUUUAC
30	845	GGAGAGUA	CUGAUGA	X	GAA	AGCCUAUC	GAUAGGCUU	UACUCUCC

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	846	GGGAGAGU	CUGAUGA	X	GAA	AAGCCUAU	AUAGGCUUU	ACUCUCCC
	847	GGGGAGAG	CUGAUGA	X	GAA	AAAGCCUA	UAGGCUUUA	CUCUCCCC
	850	ACUGGGGA	CUGAUGA	X	GAA	AGUAAAGC	GCUUUACUC	UCCCCAGU
	852	UAACUGGG	CUGAUGA	X	GAA	AGAGUAAA	UUUACUCUC	CCCAGUUA
5	859	GAUCAUGU	CUGAUGA	X	GAA	ACUGGGGA	UCCCCAGUU	ACAUGAUC
	860	UGAUCAUG	CUGAUGA	X	GAA	AACUGGGG	CCCCAGUUA	CAUGAUC
	867	GCAUAGCU	CUGAUGA	X	GAA	AUCAUGUA	UACAUGAUC	AGCUAUGC
	872	UGCCGGCA	CUGAUGA	X	GAA	AGCUGAUC	GAUCAGCUA	UGCCGGCA
	885	UCACAGAA	CUGAUGA	X	GAA	ACCAUGCC	GGCAUGGUC	UUCUGUGA
10	887	CCUCACAG	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUU	CUGUGAGG
	888	GCCUCACA	CUGAUGA	X	GAA	AAGACCAU	AUGGUCUUC	UGUGAGGC
	903	UCAUCAUU	CUGAUGA	X	GAA	AUCUUUGC	GCAAAGAUC	AAUGAUGA
	917	UAGACUGA	CUGAUGA	X	GAA	AGGUUUA	UGAAACCUA	UCAGUCUA
	919	GAUAGACU	CUGAUGA	X	GAA	AUAGGUUU	AAACCUAUC	AGUCUAUC
15	923	ACAUGAUA	CUGAUGA	X	GAA	ACUGAUAG	CUAUCAGUC	UAUCAUGU
	925	GUACAUGA	CUGAUGA	X	GAA	AGACUGAU	AUCAGUCUA	UCAUGUAC
	927	AUGUACAU	CUGAUGA	X	GAA	AUAGACUG	CAGUCUAUC	AUGUACAU
	932	CAACUAUG	CUGAUGA	X	GAA	ACAUGAUA	UAUCAUGUA	CAUAGUUG
	936	ACCACAAC	CUGAUGA	X	GAA	AUGUACAU	AUGUACAU	GUUGUGGU
20	939	ACAACCAC	CUGAUGA	X	GAA	ACUAUGUA	UACAUAGUU	GUGGUUGU
	945	UAUCCUAC	CUGAUGA	X	GAA	ACCACAAC	GUUGUGGUU	GUAGGAUA
	948	CUAUAUCC	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUA	GGAUUAUG
	953	AAAUCCUA	CUGAUGA	X	GAA	AUCCUACA	UGUAGGAUA	UAGGAUUU
	955	AUAAAUCC	CUGAUGA	X	GAA	AUAUCCUA	UAGGAUAUA	GGAUUUAU
25	960	ACAUCAUA	CUGAUGA	X	GAA	AUCCUAUA	UAUAGGAUU	UAUGAUGU
	961	CACAUCAU	CUGAUGA	X	GAA	AAUCCUAU	AUAGGAUUU	AUGAUGUG
	962	UCACAUCA	CUGAUGA	X	GAA	AAAUCCUA	UAGGAUUUA	UGAUGUGA
	972	GGGCUCAG	CUGAUGA	X	GAA	AUCACAUC	GAUGUGAUU	CUGAGCCC
	973	GGGGCUCA	CUGAUGA	X	GAA	AAUCACAU	AUGUGAUUC	UGAGCCCC
30	993	GAUAGCUC	CUGAUGA	X	GAA	AUUUCAUG	CAUGAAAUU	GAGCUAUC

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999	CCGGCAGA	CUGAUGA	X	GAA	AGCUCAAU	AUUGAGCUA	UCUGCCGG	
1001	CUCCGGCA	CUGAUGA	X	GAA	AUAGCUCA	UGAGCUAUC	UGCCGGAG	
1017	UUUAAGAC	CUGAUGA	X	GAA	AGUUUUUC	GAAAAACUU	GUCUUAAA	
1020	CAAUUUAA	CUGAUGA	X	GAA	ACAAGUUU	AAACUUGUC	UUAAAUUG	
5	1022	UACAAUUU	CUGAUGA	X	GAA	AGACAAGU	ACUUGUCUU	AAAUUGUA
1023	GUACAAUU	CUGAUGA	X	GAA	AAGACAAG	CUUGUCUUA	AAUUGUAC	
1027	CGCUGUAC	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUU	GUACAGCG	
1030	UCUCGCUG	CUGAUGA	X	GAA	ACAAUUUA	UAAAUUGUA	CAGCGAGA	
1047	CCCACAUU	CUGAUGA	X	GAA	AGCUCUGU	ACAGAGCUC	AAUGUGGG	
10	1059	GUGAAAUC	CUGAUGA	X	GAA	AGCCCCAC	GUGGGGCUU	GAUUUCAC
1063	CCAGGUGA	CUGAUGA	X	GAA	AUCAAGCC	GGCUUGAUU	UCACCUGG	
1064	GCCAGGUG	CUGAUGA	X	GAA	AAUCAAGC	GCUUGAUUU	CACCUGGC	
1065	UGCCAGGU	CUGAUGA	X	GAA	AAAUCAAG	CUUGAUUUC	ACCUGGCA	
1076	AAGGUGGA	CUGAUGA	X	GAA	AGUGCCAG	CUGGCACUC	UCCACCUU	
15	1078	UGAAGGUG	CUGAUGA	X	GAA	AGAGUGCC	GGCACUCUC	CACCUUCA
1084	AGACUUUG	CUGAUGA	X	GAA	AGGUGGAG	CUCCACCUU	CAAAGUCU	
1085	GAGACUUU	CUGAUGA	X	GAA	AAGGUGGA	UCCACCUUC	AAAGUCUC	
1091	UAUGAUGA	CUGAUGA	X	GAA	ACUUUGAA	UUCAAAGUC	UCAUCAUA	
1093	CUUAUGAU	CUGAUGA	X	GAA	AGACUUUG	CAAAGUCUC	AUCAUAAG	
20	1096	CUUCUUAU	CUGAUGA	X	GAA	AUGAGACU	AGUCUCAUC	AUAAGAAG
1099	AAUCUUCU	CUGAUGA	X	GAA	AUGAUGAG	CUCAUCAUA	AGAAGAUU	
1107	CGGUUUAC	CUGAUGA	X	GAA	AUCUUCUU	AAGAAGAUU	GUAAACCG	
1110	UCCCGGUU	CUGAUGA	X	GAA	ACAAUCUU	AAGAUUGUA	AACCGGGA	
1130	UCCCAGGA	CUGAUGA	X	GAA	AGGGUUUC	GAAACCCUU	UCCUGGGA	
25	1131	GUCCCAGG	CUGAUGA	X	GAA	AAGGGUUU	AAACCCUUU	CCUGGGAC
1132	AGUCCCAG	CUGAUGA	X	GAA	AAAGGGUU	AACCCUUC	CUGGGACU	
1154	UGCUCAAA	CUGAUGA	X	GAA	ACAUCUUC	GAAGAUGUU	UUUGAGCA	
1155	GUGCUCAA	CUGAUGA	X	GAA	AACAUCUU	AAGAUGUUU	UUGAGCAC	
1156	GGUGCUCU	CUGAUGA	X	GAA	AAACAUCU	AGAUGUUUU	UGAGCACC	
30	1157	AGGUGCUC	CUGAUGA	X	GAA	AAAACAUC	GAUGUUUUU	GAGCACCU

	1166	CUAUUGUC	CUGAUGA	X	GAA	AGGUGCUC	GAGCACCUU	GACAAUAG
	1173	ACACUUUC	CUGAUGA	X	GAA	AUUGUCA	UUGACAAUA	GAAAGUGU
	1205	CACAGGUG	CUGAUGA	X	GAA	AUUCCCCU	AGGGGAAUA	CACCUGUG
	1215	CUGGACGC	CUGAUGA	X	GAA	ACACAGGU	ACCUGUGUA	GCGUCCAG
5	1220	GUCCACUG	CUGAUGA	X	GAA	ACGCUACA	UGUAGCGUC	CAGUGGAC
	1236	UUUCUCUU	CUGAUGA	X	GAA	AUCAUCCG	CGGAUGAUC	AAGAGAAA
	1246	AAAUGUUC	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAUA	GAACAUUU
	1253	CUCGGACA	CUGAUGA	X	GAA	AUGUUCUA	UAGAACAUA	UGUCCGAG
	1254	ACUCGGAC	CUGAUGA	X	GAA	AAUGUUCU	AGAACAUA	GUCCGAGU
10	1257	UGAACUCG	CUGAUGA	X	GAA	ACAAAUGU	ACAUUUGUC	CGAGUUCA
	1263	UUUGUGUG	CUGAUGA	X	GAA	ACUCGGAC	GUCCGAGUU	CACACAAA
	1264	CUUUGUGU	CUGAUGA	X	GAA	AACUCGGA	UCCGAGUUC	ACACAAAG
	1276	AGCAAUAA	CUGAUGA	X	GAA	AGGCUUUG	CAAAGCCUU	UUAUUGCU
	1277	AAGCAAUA	CUGAUGA	X	GAA	AAGGCUUU	AAAGCCUUU	UAUUGCUU
15	1278	AAAGCAAU	CUGAUGA	X	GAA	AAAGGCUU	AAGCCUUUU	AUUGCUUU
	1279	GAAAGCAA	CUGAUGA	X	GAA	AAAAGGCU	AGCCUUUUA	UUGCUUUC
	1281	CCGAAAGC	CUGAUGA	X	GAA	AUAAAAGG	CCUUUUUAU	GCUUUCGG
	1285	ACUACCGA	CUGAUGA	X	GAA	AGCAAUAA	UUAUUGCUU	UCGGUAGU
	1286	CACUACCG	CUGAUGA	X	GAA	AAGCAAUA	UAUUGCUUU	CGGUAGUG
20	1287	CCACUACC	CUGAUGA	X	GAA	AAAGCAAU	AUUGCUUUC	GGUAGUGG
	1291	CAUCCAC	CUGAUGA	X	GAA	ACCGAAAG	CUUUCGGUA	GUGGGAUG
	1304	CCACCAAA	CUGAUGA	X	GAA	AUUUCAUC	GAUGAAAUC	UUUGGUGG
	1306	UUCCACCA	CUGAUGA	X	GAA	AGAUUUA	UGAAAUCUU	UGGUGGAA
	1307	CUUCCACC	CUGAUGA	X	GAA	AAGAUUUC	GAAAUCUUU	GGUGGAAG
25	1330	UCGGACUU	CUGAUGA	X	GAA	ACUGCCCA	UGGGCAGUC	AAGUCCGA
	1335	GGGAUUCG	CUGAUGA	X	GAA	ACUUGACU	AGUCAAGUC	CGAAUCCC
	1341	UUCACAGG	CUGAUGA	X	GAA	AUUCGGAC	GUCCGAAUC	CCUGUGAA
	1352	AACUGAGA	CUGAUGA	X	GAA	ACUUCACA	UGUGAAGUA	UCUCAGUU
	1354	GUAACUGA	CUGAUGA	X	GAA	AUACUUA	UGAAGUAUC	UCAGUUAC
30	1356	GGGUAACU	CUGAUGA	X	GAA	AGAUACUU	AAGUAUCUC	AGUUACCC

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	1360	AGCUGGGU	CUGAUGA	X	GAA	ACUGAGAU	AUCUCAGUU	ACCCAGCU
	1361	GAGCUGGG	CUGAUGA	X	GAA	AACUGAGA	UCUCAGUUA	CCCAGCUC
	1369	GAUAUCAG	CUGAUGA	X	GAA	AGCUGGGU	ACCCAGCUC	CUGAUUUC
	1375	CCAUUUGA	CUGAUGA	X	GAA	AUCAGGAG	CUCCUGAUA	UCAAUUGG
5	1377	UACCAUJU	CUGAUGA	X	GAA	AUAUCAGG	CCUGAUUUC	AAAUGGUA
	1385	CAUUCUCG	CUGAUGA	X	GAA	ACCAUUG	CAAUUGGUA	CAGAAUUG
	1404	UUGGACUC	CUGAUGA	X	GAA	AUGGGCCU	AGGCCCAUU	GAGUCCAA
	1409	UGUAGUUG	CUGAUGA	X	GAA	ACUCAUUG	CAUUGAGUC	CAACUACA
	1415	UCAUUGUG	CUGAUGA	X	GAA	AGUUGGAC	GUCCAACUA	CACAAUGA
10	1425	UCGCCAAC	CUGAUGA	X	GAA	AUCAUUGU	ACAAUGAUU	GUUGGCCA
	1428	UCAUCGCC	CUGAUGA	X	GAA	ACAAUCAU	AUGAUUGUU	GGCGAUGA
	1440	AUGAUGGU	CUGAUGA	X	GAA	AGUUCAUC	GAUGAACUC	ACCAUCAU
	1446	ACUCCAUU	CUGAUGA	X	GAA	AUGGUGAG	CUCACCAUC	AUGGAAGU
	1478	UGACCGUG	CUGAUGA	X	GAA	AGUUUCCU	AGGAAACUA	CACGGUCA
15	1485	GUGAGGAU	CUGAUGA	X	GAA	ACCGUGUA	UACACGGUC	AUCCUCAC
	1488	UUGGUGAG	CUGAUGA	X	GAA	AUGACCGU	ACGGUCAUC	CUCACCAA
	1491	GGGUUGGU	CUGAUGA	X	GAA	AGGAUGAC	GUCAUCCUC	ACCAACCC
	1503	UCCAUGA	CUGAUGA	X	GAA	AUGGGGUU	AACCCCAUU	UCAUUGGA
	1504	CUCCAUG	CUGAUGA	X	GAA	AAUGGGGU	ACCCCAUUU	CAAUGGAG
20	1505	UCUCCAUU	CUGAUGA	X	GAA	AAAUGGGG	CCCCAUUUC	AAUGGAGA
	1530	ACCAGAGA	CUGAUGA	X	GAA	ACCAUGUG	CACAUGGUC	UCUCUGGU
	1532	CAACCAGA	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUC	UCUGGUUG
	1534	CACAACCA	CUGAUGA	X	GAA	AGAGACCA	UGGUCUCUC	UGGUUGUG
	1539	ACAUUCAC	CUGAUGA	X	GAA	ACCAGAGA	UCUCUGGUU	GUGAAUGU
25	1548	UGGGGUGG	CUGAUGA	X	GAA	ACAUUCAC	GUGAAUGUC	CCACCCCA
	1560	UUCUCACC	CUGAUGA	X	GAA	AUCUGGGG	CCCCAGAUU	GGUGAGAA
	1574	GCGAGAUC	CUGAUGA	X	GAA	AGGCUUUC	GAAAGCCUU	GAUCUCGC
	1578	AUAGGCGA	CUGAUGA	X	GAA	AUCAAGGC	GCCUUGAUC	UCGCCUUA
	1580	CCAUAGGC	CUGAUGA	X	GAA	AGAUCAAG	CUUGAUCUC	GCCUAUGG
30	1585	GGAAUCCA	CUGAUGA	X	GAA	AGGCGAGA	UCUCGCCUA	UGGAUUCU

	1591	CUGGUAGG	CUGAUGA	X	GAA	AUCCAUAG	CUAUGGAUU	CCUACCAG
	1592	ACUGGUAG	CUGAUGA	X	GAA	AAUCCAUA	UAUGGAUUC	CUACCAGU
	1595	CAUACUGG	CUGAUGA	X	GAA	AGGAAUCC	GGAUUCCUA	CCAGUAUG
	1601	UGGUCCCA	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUA	UGGGACCA
5	1619	UGCAUGUC	CUGAUGA	X	GAA	AUGUCUGC	GCAGACAUU	GACAUGCA
	1632	UUGGCGUA	CUGAUGA	X	GAA	ACUGUGCA	UGCACAGUC	UACGCCAA
	1634	GGUUGGCG	CUGAUGA	X	GAA	AGACUGUG	CACAGUCUA	CGCCAACC
	1645	GUGCAGGG	CUGAUGA	X	GAA	AGGGUUGG	CCAACCCUC	CCCUGCAC
	1659	UACCACUG	CUGAUGA	X	GAA	AUGUGGUG	CACCACAUC	CAGUGGUA
10	1667	GCUGCCAG	CUGAUGA	X	GAA	ACCACUGG	CCAGUGGUA	CUGGCAGC
	1677	GCUUCUUC	CUGAUGA	X	GAA	AGCUGCCA	UGGCAGCUA	GAAGAAGC
	1691	GUCUGUAG	CUGAUGA	X	GAA	AGCAGGCU	AGCCUGCUC	CUACAGAC
	1694	CGGGUCUG	CUGAUGA	X	GAA	AGGAGCAG	CUGCUCCUA	CAGACCCG
	1718	UACAAGCA	CUGAUGA	X	GAA	ACGGGCUU	AAGCCCGUA	UGCUUGUA
15	1723	UUCUUUAC	CUGAUGA	X	GAA	AGCAUACG	CGUAUGCUU	GUAAAGAA
	1726	CCAUUCUU	CUGAUGA	X	GAA	ACAAGCAU	AUGCUUGUA	AAGAAUGG
	1750	CCCCUGGA	CUGAUGA	X	GAA	AUCCUCCA	UGGAGGAUU	UCCAGGGG
	1751	CCCCCUGG	CUGAUGA	X	GAA	AAUCCUCC	GGAGGAUUU	CCAGGGGG
	1752	CCCCCUG	CUGAUGA	X	GAA	AAAUCCUC	GAGGAUUUC	CAGGGGGG
20	1770	GUGACUUC	CUGAUGA	X	GAA	AUCUUGUU	AACAAGAUC	GAAGUCAC
	1776	UUUUUGGU	CUGAUGA	X	GAA	ACUUCGAU	AUCGAAGUC	ACCAAAAA
	1790	UCAGGGCA	CUGAUGA	X	GAA	AUUGGUUU	AAACCAUAU	UGCCCUGA
	1800	UUUCCUUC	CUGAUGA	X	GAA	AUCAGGGC	GCCCUGAUU	GAAGGAAA
	1821	AGCGUACU	CUGAUGA	X	GAA	ACAGUUUU	AAAACUGUA	AGUACGCU
25	1825	GACCAGCG	CUGAUGA	X	GAA	ACUUACAG	CUGUAAGUA	CGCUGGUC
	1833	GCUUGGAU	CUGAUGA	X	GAA	ACCAGCGU	ACGCUGGUC	AUCCAAGC
	1836	GCAGCUUG	CUGAUGA	X	GAA	AUGACCAG	CUGGUCAUC	CAAGCUGC
	1853	ACAACGCU	CUGAUGA	X	GAA	ACACGUUG	CAACGUGUC	AGCGUUGU
	1859	AUUUGUAC	CUGAUGA	X	GAA	ACGCUGAC	GUCAGCGUU	GUACAAAU
30	1862	CACAUUUG	CUGAUGA	X	GAA	ACAACGCU	AGCGUUGUA	CAAAUGUG



1878	GCUUUGUU	CUGAUGA	X	GAA	AUGGCUUC	GAAGCCAUC	AACAAAGC
1905	AAGGAGAU	CUGAUGA	X	GAA	ACCCUCUC	GAGAGGGUC	AUCUCCUU
1908	UGGAAGGA	CUGAUGA	X	GAA	AUGACCCU	AGGGUCAUC	UCCUUGCA
1910	CAUGGAAG	CUGAUGA	X	GAA	AGAUGACC	GGUCAUCUC	CUUCCAUG
5	1913	UCACAUGG	CUGAUGA	X	GAA	AGGAGAUG	CAUCUCCUU
	1914	AUCACAUG	CUGAUGA	X	GAA	AAGGAGAU	AUCUCCUUC
	1923	GGACCCCU	CUGAUGA	X	GAA	AUCACAUG	CAUGUGAUC
	1930	AAUUUCAG	CUGAUGA	X	GAA	ACCCUGA	UCAGGGGUC
	1938	UGCACAGU	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUA
10	1939	UUGCACAG	CUGAUGA	X	GAA	AAUUUCAG	CUGAAAUA
	1982	ACAACAGG	CUGAUGA	X	GAA	ACACACUC	GAGUGUGUC
	1988	CAGUGCAC	CUGAUGA	X	GAA	ACAGGGAC	GUCCUGUU
	2008	CUCAAACG	CUGAUGA	X	GAA	AUUUCUGU	ACAGAAAUA
	2012	GGUUCUCA	CUGAUGA	X	GAA	ACGUAUUU	AAUACGUU
15	2013	AGGUUCUC	CUGAUGA	X	GAA	AACGUAUU	AAUACGUU
	2022	UACCACGU	CUGAUGA	X	GAA	AGGUUCUC	GAGAACCUC
	2030	CAAGCUUG	CUGAUGA	X	GAA	ACCACGUG	CACGUGGUA
	2037	UGUGAGCC	CUGAUGA	X	GAA	AGCUUGUA	UACAAGCUU
	2042	UUGCCUGU	CUGAUGA	X	GAA	AGCCAAGC	GCUUGGCUC
20	2054	UGUGGACC	CUGAUGA	X	GAA	AUGUUGCC	GGCAACAUC
	2058	CCAUGUG	CUGAUGA	X	GAA	ACCGAUGU	ACAUCGGUC
	2072	GUGUGAGU	CUGAUGA	X	GAA	AUUCGCCC	GGGCGAAUC
	2076	ACUGGUGU	CUGAUGA	X	GAA	AGUGAUUC	GAAUCACUC
	2085	UUCUUGCA	CUGAUGA	X	GAA	ACUGGUGU	ACACCAGUU
25	2086	GUUCUUGC	CUGAUGA	X	GAA	AACUGGUG	CACCAGUUU
	2096	GAGCAUCC	CUGAUGA	X	GAA	AGUUCUUG	CAAGAACUU
	2104	UUUCCAAA	CUGAUGA	X	GAA	AGCAUCCA	UGGAUGCUC
	2106	AGUUUCCA	CUGAUGA	X	GAA	AGAGCAUC	GAUGCUCUU
	2107	CAGUUUCC	CUGAUGA	X	GAA	AAGAGCAU	AUGCUCUUU
30	2129	UGUUAGAA	CUGAUGA	X	GAA	ACAUGGUG	CACCAUGUU

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	2130	CUGUUAGA	CUGAUGA	X	GAA	AACAUGGU	ACCAUGUUU	UCUAAACAG
	2131	GCUGUUAG	CUGAUGA	X	GAA	AAACAUGG	CCAUGUUUU	CUAACAGC
	2132	UGCUGUUA	CUGAUGA	X	GAA	AAAACAUG	CAUGUUUUC	UAACAGCA
	2134	UGUGCUGU	CUGAUGA	X	GAA	AGAAAACA	UGUUUUCUA	ACAGCACA
5	2151	ACAAUCAA	CUGAUGA	X	GAA	AUGUCAUU	AAUGACAUC	UUGAUUGU
	2153	CCACAAUC	CUGAUGA	X	GAA	AGAUGUCA	UGACAUCUU	GAUUGUGG
	2157	AAUGCCAC	CUGAUGA	X	GAA	AUCAAGAU	AUCUUGAUU	GUGGCAUU
	2165	CAUUCUGA	CUGAUGA	X	GAA	AUGCCACA	UGUGGCAUU	UCAGAAUG
	2166	GCAUUCUG	CUGAUGA	X	GAA	AAUGCCAC	GUGGCAUUU	CAGAAUGC
10	2167	GGCAUUCU	CUGAUGA	X	GAA	AAAUGCCA	UGGCAUUUC	AGAAUGCC
	2177	CCUGCAGA	CUGAUGA	X	GAA	AGGCAUUC	GAAUGCCUC	UCUGCAGG
	2179	GUCCUGCA	CUGAUGA	X	GAA	AGAGGCAU	AUGCCUCUC	UGCAGGAC
	2198	AGCAAACA	CUGAUGA	X	GAA	AGUCGCCU	AGGCGACUA	UGUUUGCU
	2202	GCAGAGCA	CUGAUGA	X	GAA	ACAUAGUC	GACUAUGUU	UGCUCUGC
15	2203	AGCAGAGC	CUGAUGA	X	GAA	AACAUAGU	ACUAUGUUU	GCUCUGCU
	2207	CUUGAGCA	CUGAUGA	X	GAA	AGCAAACA	UGUUUGCUC	UGCUCAAG
	2212	CUUAUCUU	CUGAUGA	X	GAA	AGCAGAGC	GCUCUGCUC	AAGAUAA
	2218	GGUCUUCU	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAU	AGAAGACC
	2239	GACCAGGC	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUU	GCCUGGUC
20	2247	AGCUGUUU	CUGAUGA	X	GAA	ACCAGGCA	UGCCUGGUC	AAACAGCU
	2256	AGGAUGAU	CUGAUGA	X	GAA	AGCUGUUU	AAACAGCUC	AUCAUCCU
	2259	UCUAGGAU	CUGAUGA	X	GAA	AUGAGCUG	CAGCUCAUC	AUCCUAGA
	2262	CGCUCUAG	CUGAUGA	X	GAA	AUGAUGAG	CUCAUCAUC	CUAGAGCG
	2265	AUGCGCUC	CUGAUGA	X	GAA	AGGAUGAU	AUCAUCCUA	GAGCGCAU
25	2286	UUUCCGGU	CUGAUGA	X	GAA	AUCAUGGG	CCCAUGAUC	ACCGGAAA
	2296	AUUCUCCA	CUGAUGA	X	GAA	AUUUCCGG	CCGGAAAUC	UGGAGAAU
	2305	UGUUGUCU	CUGAUGA	X	GAA	AUUCUCCA	UGGAGAAUC	AGACAACA
	2319	GUCUCGCC	CUGAUGA	X	GAA	AUGGUUGU	ACAACCAUU	GGCGAGAC
	2331	GUCACUUC	CUGAUGA	X	GAA	AUGGUCUC	GAGACCAUU	GAAGUGAC
30	2341	UGCUGGGC	CUGAUGA	X	GAA	AGUCACUU	AAGUGACUU	GCCCAGCA

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	2351	GAUUUCCA	CUGAUGA	X	GAA	AUGCUGGG	CCCAGCAUC	UGGAAAUC
	2359	UGGGGUAG	CUGAUGA	X	GAA	AUUUCCAG	CUGGAAAUC	CUACCCCA
	2362	GUGUGGGG	CUGAUGA	X	GAA	AGGAUUUC	GAAAUCCUA	CCCCACAC
	2373	AACCAUGU	CUGAUGA	X	GAA	AUGUGUGG	CCACACAUU	ACAUGGUU
5	2374	GAACCAUG	CUGAUGA	X	GAA	AAUGUGUG	CACACAUUA	CAUGGUUC
	2381	UGUCUUUG	CUGAUGA	X	GAA	ACCAUGUA	UACAUGGUU	CAAAGACA
	2382	UUGUCUUU	CUGAUGA	X	GAA	AACCAUGU	ACAUGGUUC	AAAGACAA
	2403	GAAUCUUC	CUGAUGA	X	GAA	ACCAGGGU	ACCCUGGUA	GAAGAUUC
	2410	AAUGCCUG	CUGAUGA	X	GAA	AUCUUCUA	UAGAAGAUU	CAGGCAUU
10	2411	CAAUGCCU	CUGAUGA	X	GAA	AAUCUUCU	AGAAGAUUC	AGGCAUUG
	2418	CUCAGUAC	CUGAUGA	X	GAA	AUGCCUGA	UCAGGCAUU	GUACUGAG
	2421	UCUCUCAG	CUGAUGA	X	GAA	ACAAUGCC	GGCAUUGUA	CUGAGAGA
	2449	CCUGCGGA	CUGAUGA	X	GAA	AGUCAGGU	ACCUGACUA	UCCGCAGG
	2451	ACCCUGCG	CUGAUGA	X	GAA	AUAGUCAG	CUGACUAUC	CGCAGGGU
15	2481	CAGGUGUA	CUGAUGA	X	GAA	AGGCCUCC	GGAGGCCUC	UACACCUG
	2483	GGCAGGUG	CUGAUGA	X	GAA	AGAGGCCU	AGGCCUCUA	CACCUGCC
	2505	CAGCCAAG	CUGAUGA	X	GAA	ACAUUGCA	UGCAAUGUC	CUUGGCUG
	2508	GCACAGCC	CUGAUGA	X	GAA	AGGACAUU	AAUGUCCUU	GGCUGUGC
	2532	AUUAUGAA	CUGAUGA	X	GAA	AGCGUCUC	GAGACGCUC	UUCAUAAU
20	2534	CUAUUAUG	CUGAUGA	X	GAA	AGAGCGUC	GACGCUCUU	CAUAAUAG
	2535	UCUAUUAU	CUGAUGA	X	GAA	AAGAGCGU	ACGCUCUUC	AUAAUAGA
	2538	CCUUCUUAU	CUGAUGA	X	GAA	AUGAAGAG	CUCUUCAUA	AUAGAAGG
	2541	GCACCUUC	CUGAUGA	X	GAA	AUUAUGAA	UUCAUAAUA	GAAGGUGC
	2567	UGACUUCC	CUGAUGA	X	GAA	AGUUGGUC	GACCAACUU	GGAAGUCA
25	2574	AGGAUAAU	CUGAUGA	X	GAA	ACUUCCAA	UUGGAAGUC	AUUAUCCU
	2577	ACGAGGAU	CUGAUGA	X	GAA	AUGACUUC	GAAGUCAUU	AUCCUCGU
	2578	GACGAGGA	CUGAUGA	X	GAA	AAUGACUU	AAGUCAUUA	UCCUCGUC
	2580	CCGACGAG	CUGAUGA	X	GAA	AUAAUGAC	GUCAUUAUC	CUCGUCGG
	2583	GUGCCGAC	CUGAUGA	X	GAA	AGGAUAAU	AUUAUCCUC	GUCGGCAC
30	2586	GCAGUGCC	CUGAUGA	X	GAA	ACGAGGAU	AUCCUCGUC	GGCACUGC

	2601	AACAUGGC	CUGAUGA	X	GAA	AUCACUGC	GCAGUGAUU	GCCAUGUU
	2609	GCCAGAAG	CUGAUGA	X	GAA	ACAUGGCA	UGCCAUGUU	CUUCUGGC
	2610	AGCCAGAA	CUGAUGA	X	GAA	AACAUGGC	GCCAUGUUC	UUCUGGCU
	2612	GGAGCCAG	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUU	CUGGCUCC
5	2613	AGGAGCCA	CUGAUGA	X	GAA	AAGAACAU	AUGUUCUUC	UGGCUCCU
	2619	ACAAGAAG	CUGAUGA	X	GAA	AGCCAGAA	UUCUGGCUC	CUUCUUGU
	2622	AUGACAAG	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUU	CUUGUCAU
	2623	AAUGACAA	CUGAUGA	X	GAA	AAGGAGCC	GGCUCCUUC	UUGUCAUU
	2625	ACAAUGAC	CUGAUGA	X	GAA	AGAAGGAG	CUCCUUCUU	GUCAUUGU
10	2628	AGGACAAU	CUGAUGA	X	GAA	ACAAGAAG	CUUCUUGUC	AUUGUCCU
	2631	CGUAGGAC	CUGAUGA	X	GAA	AUGACAAG	CUUGUCAUU	GUCCUACG
	2634	GUCCGUAG	CUGAUGA	X	GAA	ACAAUGAC	GUCAUUGUC	CUACGGAC
	2637	ACGGUCCG	CUGAUGA	X	GAA	AGGACAAU	AUUGUCCUA	CGGACCGU
	2646	GCCCCGCU	CUGAUGA	X	GAA	ACGGUCCG	CGGACCGUU	AAGCGGGC
15	2647	GGCCCCGU	CUGAUGA	X	GAA	AACGGUCC	GGACCGUUA	AGCGGGCC
	2681	UAGACAAG	CUGAUGA	X	GAA	AGCCUGUC	GACAGGCUA	CUUGUCUA
	2684	CAAUAGAC	CUGAUGA	X	GAA	AGUAGCCU	AGGCUACUU	GUCUAUUG
	2687	UGACAAUA	CUGAUGA	X	GAA	ACAAGUAG	CUACUUGUC	UAUUGUCA
	2689	CAUGACAA	CUGAUGA	X	GAA	AGACAAGU	ACUUGUCUA	UUGUCAUG
20	2691	UCCAUGAC	CUGAUGA	X	GAA	AUAGACAA	UUGUCUAUU	GUCAUGGA
	2694	GGAUCCAU	CUGAUGA	X	GAA	ACAAUAGA	UCUAUUGUC	AUGGAUCC
	2701	UUCAUCUG	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUC	CAGAUGAA
	2711	CCAAGGGC	CUGAUGA	X	GAA	AUUCAUCU	AGAUGAAUU	GCCCUUGG
	2717	GCUCAUCC	CUGAUGA	X	GAA	AGGGCAAU	AUUGCCCUU	GGAUGAGC
25	2738	CAUAAGGC	CUGAUGA	X	GAA	AGCGUUCA	UGAACGCUU	GCCUUAUG
	2743	GGCAUCAU	CUGAUGA	X	GAA	AGGCAAGC	GCUUGCCUU	AUGAUGCC
	2744	UGGCAUCA	CUGAUGA	X	GAA	AAGGCAAG	CUUGCCUUA	UGAUGCCA
	2765	CCCUGGGG	CUGAUGA	X	GAA	AUUCCAC	GUGGGAAUU	CCCCAGGG
	2766	UCCUGGGG	CUGAUGA	X	GAA	AAUCCCA	UGGGAAUUC	CCCAGGGA
30	2787	GGUUUUC	CUGAUGA	X	GAA	AGUUUCAG	CUGAAACUA	GGAAAACC

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	2797	GCGGCCAA	CUGAUGA	X	GAA	AGGUUUUC	GAAAACCUC	UUGGCCGC
	2799	CCGCGGCC	CUGAUGA	X	GAA	AGAGGUUU	AAACCUCUU	GGCCGCGG
	2813	CUUGGCCG	CUGAUGA	X	GAA	AGGCACCG	CGGUGCCUU	CGGCCAAG
	2814	ACUUGGCC	CUGAUGA	X	GAA	AAGGCACC	GGUGCCUUC	GGCCAAGU
5	2826	UCUGCCUC	CUGAUGA	X	GAA	AUCACUUG	CAAGUGAUU	GAGGCAGA
	2839	AAUUCCAA	CUGAUGA	X	GAA	AGCGUCUG	CAGACGCUU	UUGGAAUU
	2840	CAAUUCCA	CUGAUGA	X	GAA	AAGCGUCU	AGACGCUUU	UGGAAUUG
	2841	UCAAUUCC	CUGAUGA	X	GAA	AAAGCGUC	GACGCUUUU	GGAAUUGA
	2847	GUCUUGUC	CUGAUGA	X	GAA	AUUCCAAA	UUUGGAAUU	GACAAGAC
10	2863	UGUUUUGC	CUGAUGA	X	GAA	AGUCGCUG	CAGCGACUU	GCAAACA
	2874	UUGACGGC	CUGAUGA	X	GAA	ACUGUUUU	AAAACAGUA	GCCGUCAA
	2880	AACAUCUU	CUGAUGA	X	GAA	ACGGCUAC	GUAGCCGUC	AAGAUGUU
	2888	CUUCUUUC	CUGAUGA	X	GAA	ACAUCUUG	CAAGAUGUU	GAAAGAAG
	2917	GAGGGCUC	CUGAUGA	X	GAA	AUGCUCGC	GCGAGCAUC	GAGCCCUC
15	2925	UCAGACAU	CUGAUGA	X	GAA	AGGGCUCG	CGAGCCCUC	AUGUCUGA
	2930	UGAGUUCA	CUGAUGA	X	GAA	ACAUGAGG	CCUCAUGUC	UGAACUCA
	2937	AGGAUCUU	CUGAUGA	X	GAA	AGUUCAGA	UCUGAACUC	AAGAUCCU
	2943	UGGAUGAG	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGauc	CUCAUCCA
	2946	AUGUGGAU	CUGAUGA	X	GAA	AGGAUCUU	AAGAUCCUC	AUCCACAU
20	2949	CCAAUGUG	CUGAUGA	X	GAA	AUGAGGAU	AUCCUCAUC	CACAUUGG
	2955	UGGUGACC	CUGAUGA	X	GAA	AUGUGGAU	AUCCACAUU	GGUCACCA
	2959	GAGAUGGU	CUGAUGA	X	GAA	ACCAAUGU	ACAUUGGUC	ACCAUCUC
	2965	CACAUUGA	CUGAUGA	X	GAA	AUGGUGAC	GUCACCAUC	UCAUGUG
	2967	ACCACAUU	CUGAUGA	X	GAA	AGAUGGUG	CACCAUCUC	AAUGUGGU
25	2982	GCGCCUAG	CUGAUGA	X	GAA	AGGUUCAC	GUGAACCUC	CUAGGCGC
	2985	CAGGCGCC	CUGAUGA	X	GAA	AGGAGGUU	AACCUCCUA	GGCGCCUG
	3013	CACCAUGA	CUGAUGA	X	GAA	AGGCCUC	GAGGGCCUC	UCAUGGUG
	3015	AUCACCAU	CUGAUGA	X	GAA	AGAGGCC	GGGCCUCUC	AUGGUGAU
	3024	AAUUCCAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUU	GUGGAAUU
30	3032	ACUUGCAG	CUGAUGA	X	GAA	AUUCCACA	UGUGGAAUU	CUGCAAGU

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	3033	AACUUGCA	CUGAUGA	X	GAA	AAUUCCAC	GUGGAAUUC	UGCAAGUU
	3041	GGUUUCCA	CUGAUGA	X	GAA	ACUUGCAG	CUGCAAGUU	UGGAAACC
	3042	AGGUUJUC	CUGAUGA	X	GAA	AACUUGCA	UGCAAGUUU	GGAAACCU
	3051	UAAGUUGA	CUGAUGA	X	GAA	AGGUUJUC	GGAAACCUA	UCAACUUA
5	3053	AGUAAGUU	CUGAUGA	X	GAA	AUAGGUUU	AAACCUAUC	AACUUACU
	3058	CCGUAAGU	CUGAUGA	X	GAA	AGUUGAUA	UAUCAACUU	ACUUACGG
	3059	CCCGUAAG	CUGAUGA	X	GAA	AAGUUGAU	AUCAACUUA	CUUACGGG
	3062	UGCCCCGU	CUGAUGA	X	GAA	AGUAAGUU	AACUUACUU	ACGGGGCA
	3063	UUGCCCCG	CUGAUGA	X	GAA	AAGUAAGU	ACUUACUUA	CGGGGGCAA
10	3083	AGGGAACA	CUGAUGA	X	GAA	AUUCAUUU	AAAUGAAUU	UGUUCCCU
	3084	UAGGGAAC	CUGAUGA	X	GAA	AAUUCAUU	AAUGAAUUU	GUUCCCUA
	3087	UUAUAGGG	CUGAUGA	X	GAA	ACAAAUUC	GAAUUUGUU	CCCUAUAA
	3088	CUUAUAGG	CUGAUGA	X	GAA	AACAAAUU	AAUUUGUUC	CCUAUAAG
	3092	UGCUCUUA	CUGAUGA	X	GAA	AGGGAACA	UGUUCCCUA	UAAGAGCA
15	3094	UUUGCUCU	CUGAUGA	X	GAA	AUAGGGAA	UUCCCUAUA	AGAGCAAA
	3113	CCUGGCGG	CUGAUGA	X	GAA	AGCGUGCC	GGCACGCUU	CCGCCAGG
	3114	CCCUGGCG	CUGAUGA	X	GAA	AAGCGUGC	GCACGCUUC	CGCCAGGG
	3131	CCCCAACG	CUGAUGA	X	GAA	AGUCCUUG	CAAGGACUA	CGUUGGGG
	3135	AGCUCCCC	CUGAUGA	X	GAA	ACGUAGUC	GACUACGUU	GGGGAGCU
20	3144	UCCACGGA	CUGAUGA	X	GAA	AGCUCCCC	GGGGAGCUC	UCCGUGGA
	3146	GAUCCACG	CUGAUGA	X	GAA	AGAGCUCC	GGAGCUCUC	CGUGGAUC
	3154	UCUUUUCA	CUGAUGA	X	GAA	AUCCACGG	CCGUGGAUC	UGAAAAGA
	3167	UGCUGUCC	CUGAUGA	X	GAA	AGCGUCUU	AAGACGCUU	GGACAGCA
	3177	CUGCUGGU	CUGAUGA	X	GAA	AUGCUGUC	GACAGCAUC	ACCAGCAG
25	3194	AGCUGGCA	CUGAUGA	X	GAA	AGCUCUGG	CCAGAGCUC	UGCCAGCU
	3203	CAAAGCCU	CUGAUGA	X	GAA	AGCUGGCA	UGCCAGCUC	AGGCUUUG
	3209	CCUCAACA	CUGAUGA	X	GAA	AGCCUGAG	CUCAGGCUU	UGUUGAGG
	3210	UCCUCAAC	CUGAUGA	X	GAA	AAGCCUGA	UCAGGCUUU	GUUGAGGA
	3213	UUCUCCUC	CUGAUGA	X	GAA	ACAAAGCC	GGCUUUGUU	GAGGAGAA
30	3224	CACUGAGC	CUGAUGA	X	GAA	AUUUCUCC	GGAGAAAUC	GCUCAGUG

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	3228	ACAUCACU	CUGAUGA	X	GAA	AGCGAUUU	AAAUCGCUC	AGUGAUGU
	3237	UCUUCCUC	CUGAUGA	X	GAA	ACAUCACU	AGUGAUGUA	GAGGAAGA
	3253	UUCUUCAG	CUGAUGA	X	GAA	AGCUUCUU	AAGAAGCUU	CUGAAGAA
	3254	GUUCUUCA	CUGAUGA	X	GAA	AAGCUUCU	AGAAGCUUC	UGAAGAAC
5	3266	AGUCCUUG	CUGAUGA	X	GAA	ACAGUUCU	AGAACUGUA	CAAGGACU
	3275	AGGUCAGG	CUGAUGA	X	GAA	AGUCCUUG	CAAGGACUU	CCUGACCU
	3276	AAGGUCAG	CUGAUGA	X	GAA	AAGUCCUU	AAGGACUUC	CUGACCTU
	3284	GAUGCUC	CUGAUGA	X	GAA	AGGUCAGG	CCUGACCUU	GGAGCAUC
	3292	ACAGAUGA	CUGAUGA	X	GAA	AUGCUC	UGGAGCAUC	UCAUCUGU
10	3294	UAACAGAU	CUGAUGA	X	GAA	AGAUGCUC	GAGCAUCUC	AUCUGUUA
	3297	CUGUAACA	CUGAUGA	X	GAA	AUGAGAUG	CAUCUCAUC	UGUUACAG
	3301	GAAGCUGU	CUGAUGA	X	GAA	ACAGAUGA	UCAUCUGUU	ACAGCUUC
	3302	GGAAGCUG	CUGAUGA	X	GAA	AACAGAUG	CAUCUGUUA	CAGCUUCC
	3308	CCACUUGG	CUGAUGA	X	GAA	AGCUGUAA	UUACAGCUU	CCAAGUGG
15	3309	GCCACUUG	CUGAUGA	X	GAA	AAGCUGUA	UACAGCUUC	CAAGUGGC
	3319	CAUGCCCU	CUGAUGA	X	GAA	AGCCACUU	AAGUGGCUA	AGGGCAUG
	3332	AUGCCAAG	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	CUUGGCAU
	3333	GAUGCCAA	CUGAUGA	X	GAA	AACUCCA	AUGGAGUUC	UUGGCAUC
	3335	UUGAUGCC	CUGAUGA	X	GAA	AGAACUCC	GGAGUUCUU	GGCAUCAA
20	3341	ACUUCCUU	CUGAUGA	X	GAA	AUGCCAAG	CUUGGCAUC	AAGGAAGU
	3352	CCUGUGGA	CUGAUGA	X	GAA	ACACUUCC	GGAAGUGUA	UCCACAGG
	3354	UCCCUGUG	CUGAUGA	X	GAA	AUACACUU	AAGUGUAUC	CACAGGGA
	3381	GAUAGGAG	CUGAUGA	X	GAA	AUGUUUCG	CGAAACAUU	CUCCUAUC
	3382	CGAUAGGA	CUGAUGA	X	GAA	AAUGUUUC	GAAACAUUC	UCCUAUCG
25	3384	UCCGAUAG	CUGAUGA	X	GAA	AGAAUGUU	AACAUUCUC	CUAUCGGA
	3387	UUCUCCGA	CUGAUGA	X	GAA	AGGAGAAU	AUUCUCCUA	UCGGAGAA
	3389	UCUUCUCC	CUGAUGA	X	GAA	AUAGGAGA	UCUCCUAUC	GGAGAAGA
	3405	CAGAUUUU	CUGAUGA	X	GAA	ACCACAUU	AAUGUGGUU	AAGAUCUG
	3406	ACAGAUCU	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUA	AGAUCUGU
30	3411	AAGUCACA	CUGAUGA	X	GAA	AUCUUAAC	GUUAAGAUC	UGUGACUU

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	3419	CCAAGCCG	CUGAUGA	X	GAA	AGUCACAG	CUGUGACUU	CGGCUUGG
	3420	GCCAAGCC	CUGAUGA	X	GAA	AAGUCACA	UGUGACUUC	GGCUUGGC
	3425	CCCGGGCC	CUGAUGA	X	GAA	AGCCGAAG	CUUCGGCUU	GGCCCCGGG
	3438	UCUUUAUA	CUGAUGA	X	GAA	AUGUCCCG	CGGGACAUU	UAUAAAGA
5	3439	GUCUUUAU	CUGAUGA	X	GAA	AAUGUCCC	GGGACAUUU	AUAAAGAC
	3440	GGUCUUUA	CUGAUGA	X	GAA	AAAUGUCC	GGACAUUUA	UAAAGACC
	3442	CGGGUCUU	CUGAUGA	X	GAA	AUAAAUGU	ACAUUUUAU	AAGACCCG
	3454	UCUGACAU	CUGAUGA	X	GAA	AUCCGGGU	ACCCGGAUU	AUGUCAGA
	3455	UUCUGACA	CUGAUGA	X	GAA	AAUCCGGG	CCCGGAUUA	UGUCAGAA
10	3459	CCUUUUCU	CUGAUGA	X	GAA	ACAUAUUC	GAUUAUGUC	AGAAAAGG
	3480	UUCAAAGG	CUGAUGA	X	GAA	AGUCGGGC	GCCCGACUC	CCUUUGAA
	3484	CCACUUCA	CUGAUGA	X	GAA	AGGGAGUC	GACUCCCUU	UGAAGUGG
	3485	UCCACUUC	CUGAUGA	X	GAA	AAGGGAGU	ACUCCCUUU	GAAGUGGA
	3510	CUGUCAAA	CUGAUGA	X	GAA	AUGGUUUC	GAAACCAUU	UUUGACAG
15	3511	UCUGUCAA	CUGAUGA	X	GAA	AAUGGUUU	AAACCAUUU	UUGACAGA
	3512	CUCUGUCA	CUGAUGA	X	GAA	AAAUGGUU	AACCAUUUU	UGACAGAG
	3513	ACUCUGUC	CUGAUGA	X	GAA	AAAUGGUU	ACCAUUUUU	GACAGAGU
	3522	AUUGUGUA	CUGAUGA	X	GAA	ACUCUGUC	GACAGAGUA	UACACAAU
	3524	GAAUUGUG	CUGAUGA	X	GAA	AUACUCUG	CAGAGUAUA	CACAAUUC
20	3531	UCGCUCUG	CUGAUGA	X	GAA	AUUGUGUA	UACACAAUU	CAGAGCGA
	3532	AUCGCUCU	CUGAUGA	X	GAA	AAUUGUGU	ACACAAUUC	AGAGCGAU
	3548	CACCGAAA	CUGAUGA	X	GAA	ACCACACA	UGUGUGGUC	UUUCGGUG
	3550	CACACCGA	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUU	UCGGUGUG
	3551	ACACACCG	CUGAUGA	X	GAA	AAGACCAC	GUGGUCUUU	CGGUGUGU
25	3552	AACACACC	CUGAUGA	X	GAA	AAAGACCA	UGGUCUUUC	GGUGUGUU
	3560	CCCAGAGC	CUGAUGA	X	GAA	ACACACCG	CGGUGUGUU	GCUCUGGG
	3564	AUUUCCCA	CUGAUGA	X	GAA	AGCAACAC	GUGUUGCUC	UGGGAAAU
	3573	AAGGAAAA	CUGAUGA	X	GAA	AUUUCCCA	UGGGAAAUU	UUUUCCUU
	3575	CUAAGGAA	CUGAUGA	X	GAA	AUAUUUCC	GGAAAUUUU	UUCCUUAG
30	3576	CCUAAGGA	CUGAUGA	X	GAA	AAUAUUUC	GAAAUUUUU	UCCUUAGG



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3577 ACCUAAGG CUGAUGA X GAA AAAUAUUU AAAUAUUUU CCUUAGGU  
3578 CACCUAAG CUGAUGA X GAA AAAUAUUU AAUAUUUUC CUUAGGUG  
3581 AGGCACCU CUGAUGA X GAA AGGAAAAU AUUUUCCUU AGGUGCCU  
3582 GAGGCACC CUGAUGA X GAA AAGGAAAA UUUUCCUUA GGUGCCUC  
5 3590 GGUAUGGG CUGAUGA X GAA AGGCACCU AGGUGCCUC CCCAUACC  
3596 CCCCAGGG CUGAUGA X GAA AUGGGGAG CUCCCCAUU CCCUGGGG  
3606 UCAAUCUU CUGAUGA X GAA ACCCCAGG CCUGGGGUC AAGAUUGA  
3612 UCUUCAUC CUGAUGA X GAA AUCUUGAC GUCAAGAUU GAUGAAGA  
3623 UCCUACAA CUGAUGA X GAA AUUCUUCA UGAAGAAU UUGUAGGA  
10 3624 CUCCUACA CUGAUGA X GAA AAUUCUUC GAAGAAUUU UGUAGGAG  
3625 UCUCUAC CUGAUGA X GAA AAAUUCUU AAGAAUUUU GUAGGAGA  
3628 CAAUCUCC CUGAUGA X GAA ACAAAAUU AAUUUUGUA GGAGAUUG  
3635 CUUCUUUC CUGAUGA X GAA AUCUCCUA UAGGAGAUU GAAAGAAG  
3649 CCGCAUUC CUGAUGA X GAA AGUUCUUU AAGGAACUA GAAUGCGG  
15 3661 GUAGUCAG CUGAUGA X GAA AGCCCGCA UGCGGGCUC CUGACUAC  
3668 GGGUAGUG CUGAUGA X GAA AGUCAGGA UCCUGACUA CACUACCC  
3673 UUCUGGGG CUGAUGA X GAA AGUGUAGU ACUACACUA CCCCAGAA  
3686 UGGUCUGG CUGAUGA X GAA ACAUUUCU AGAAAUGUA CCAGACCA  
3734 CUGAAAAC CUGAUGA X GAA AGGGUCUC GAGACCCUC GUUUUCAG  
20 3737 ACUCUGAA CUGAUGA X GAA ACGAGGGU ACCCUCGUU UUCAGAGU  
3738 AACUCUGA CUGAUGA X GAA AACGAGGG CCCUCGUUU UCAGAGUU  
3739 CAACUCUG CUGAUGA X GAA AAACGAGG CCUCGUUUU CAGAGUUG  
3740 CCAACUCU CUGAUGA X GAA AAAACGAG CUCGUUUUC AGAGUUGG  
3746 GCUCCACC CUGAUGA X GAA ACUCUGAA UUCAGAGUU GGUGGAGC  
25 3757 GUUUCCCA CUGAUGA X GAA AUGCUCCA UGGAGCAUU UGGGAAAC  
3758 GGUUUCCC CUGAUGA X GAA AAUGCUCC GGAGCAUUU GGGAAACC  
3768 GCUUGCAG CUGAUGA X GAA AGGUUUCG GGAAACCUC CUGCAAGC  
3803 GAACAAUA CUGAUGA X GAA AGUCUUUG CAAAGACUA UAUUGUUC  
3805 AAGAACAA CUGAUGA X GAA AUAGUCUU AAGACUAUA UUGUUCUU  
30 3807 GGAAGAAC CUGAUGA X GAA AUAUAGUC GACUAUAUU GUUCUUC

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	3810	AUUGGAAG	CUGAUGA	X	GAA	ACAAUAUA	UAUAUUGUU	CUUCCAAU
	3811	CAUUGGAA	CUGAUGA	X	GAA	AACAAUAU	AUAUUGUUC	UUCCAAUG
	3813	GACAUUGG	CUGAUGA	X	GAA	AGAACAAU	AUUGUUCUU	CCAAUGUC
	3814	UGACAUUG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUC	CAAUGUCA
5	3821	GUGUCUCU	CUGAUGA	X	GAA	ACAUUGGA	UCCAAUGUC	AGAGACAC
	3847	GAGUCCAG	CUGAUGA	X	GAA	AUCCUCUU	AAGAGGAUU	CUGGACUC
	3848	AGAGUCCA	CUGAUGA	X	GAA	AAUCCUCU	AGAGGAUUC	UGGACUCU
	3855	GGCAGGGA	CUGAUGA	X	GAA	AGUCCAGA	UCUGGACUC	UCCCUGCC
	3857	UAGGCAGG	CUGAUGA	X	GAA	AGAGUCCA	UGGACUCUC	CCUGCCUA
10	3865	AGGUGAGG	CUGAUGA	X	GAA	AGGCAGGG	CCCUGCCUA	CCUCACCU
	3869	AAACAGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCUGUUU
	3876	AUACAGGA	CUGAUGA	X	GAA	ACAGGUGA	UCACCUGUU	UCCUGUAU
	3877	CAUACAGG	CUGAUGA	X	GAA	AACAGGUG	CACCUGUUU	CCUGUAUG
	3878	CCAUACAG	CUGAUGA	X	GAA	AAACAGGU	ACCUGUUUC	CUGUAUGG
15	3883	UUCCUCCA	CUGAUGA	X	GAA	ACAGGAAA	UUUCCUGUA	UGGAGGAA
	3914	CAUAAUGG	CUGAUGA	X	GAA	AUUUGGGG	CCCCAAAUU	CCAUUAUG
	3915	UCAUAAUG	CUGAUGA	X	GAA	AAUUUGGG	CCCCAAUUC	CAUUAUGA
	3919	GUUGUCAU	CUGAUGA	X	GAA	AUGGAAUU	AAUUCCAUU	AUGACAAC
	3920	UGUUGUCA	CUGAUGA	X	GAA	AAUGGAAU	AUUCCAUAU	UGACAACA
20	3939	UAAUGACU	CUGAUGA	X	GAA	AUUCCUGC	GCAGGAAUC	AGUCAUAU
	3943	GAGAUAAU	CUGAUGA	X	GAA	ACUGAUUC	GAAUCAGUC	AUUAUCUC
	3946	CUGGAGAU	CUGAUGA	X	GAA	AUGACUGA	UCAGUCAUU	AUCUCCAG
	3947	UCUGGAGA	CUGAUGA	X	GAA	AAUGACUG	CAGUCAUAU	UCUCCAGA
	3949	GUUCUGGA	CUGAUGA	X	GAA	AUAAUGAC	GUCAUUAUC	UCCAGAAC
25	3951	CUGUUCUG	CUGAUGA	X	GAA	AGAUAAUG	CAUUAUCUC	CAGAACAG
	3961	CUUUCGCU	CUGAUGA	X	GAA	ACUGUUCU	AGAACAGUA	AGCGAAAG
	3987	AAUGUUUU	CUGAUGA	X	GAA	ACACUCAC	GUGAGUGUA	AAAACAUU
	3995	UAUCUUCA	CUGAUGA	X	GAA	AUGUUUUU	AAAAACAUU	UGAAGAUU
	3996	AUAUCUUC	CUGAUGA	X	GAA	AAUGUUUU	AAAACAUUU	GAAGAUUU
30	4003	CAAUGGGA	CUGAUGA	X	GAA	AUCUUCAA	UUGAAGAUU	UCCCAUUG

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	4005	UCCAAUGG	CUGAUGA	X	GAA	AUAUCUUC	GAAGAUauc	CCAUUGGA
	4010	GUUCCUCC	CUGAUGA	X	GAA	AUGGGAUA	UAUCCCAUu	GGAGGAAC
	4026	AUCACUUU	CUGAUGA	X	GAA	ACUUCUGG	CCAGAAGUA	AAAGUGAU
	4035	UCAUCUGG	CUGAUGA	X	GAA	AUCACUUU	AAAGUGAUC	CCAGAUGA
5	4068	GAUGCAAG	CUGAUGA	X	GAA	ACCAUCCC	GGGAUGGUC	CUUGCAUC
	4071	UCUGAUGC	CUGAUGA	X	GAA	AGGACCAU	AUGGUCCUu	GCAUCAGA
	4076	GCUCUUCU	CUGAUGA	X	GAA	AUGCAAGG	CCUUGCAUC	AGAAGAGC
	4093	GUCUCCA	CUGAUGA	X	GAA	AGUUUJCA	UGAAAACUC	UGGAAGAC
	4112	AUGGAGAU	CUGAUGA	X	GAA	AUUUGUUC	GAACAAAUu	AUCUCCA
10	4113	GAUGGAGA	CUGAUGA	X	GAA	AAUUUGUU	AACAAAUUA	UCUCCAUC
	4115	AAGAUGGA	CUGAUGA	X	GAA	AUAAUUUG	CAAAUUUAUC	UCCAUCUU
	4117	AAAAGAUG	CUGAUGA	X	GAA	AGAUAAUU	AAUUAUCUC	CAUCUUUU
	4121	CACCAAAA	CUGAUGA	X	GAA	AUGGAGAU	AUCUCCAUC	UUUUGGUG
	4123	UCCACCAA	CUGAUGA	X	GAA	AGAUGGAG	CUCCAUCUU	UUGGUGGA
15	4124	UCCACCA	CUGAUGA	X	GAA	AAGAUGGA	UCCAUCUUu	UGGUGGAA
	4125	AUCCACC	CUGAUGA	X	GAA	AAAGAUGG	CCAUCUUUU	GGUGGAAU
	4144	CCUGCUUU	CUGAUGA	X	GAA	ACUGGGCA	UGCCCAGUA	AAAGCAGG
	4157	AGGCCACA	CUGAUGA	X	GAA	ACUCCUG	CAGGGAGUC	UGUGGCCU
	4166	AGCCUCC	CUGAUGA	X	GAA	AGGCCACA	UGUGGCCUC	GGAAGGCU
20	4175	UCUGGUUG	CUGAUGA	X	GAA	AGCCUCC	GGAAGGCUC	CAACCAGA
	4193	CAGACUGG	CUGAUGA	X	GAA	AGCCACUG	CAGUGGCUA	CCAGUCUG
	4199	GAUACCCA	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUC	UGGGUAUC
	4205	CUGAGUGA	CUGAUGA	X	GAA	ACCCAGAC	GUCUGGGUA	UCACUCAG
	4207	AUCUGAGU	CUGAUGA	X	GAA	AUACCCAG	CUGGGUAUC	ACUCAGAU
25	4211	UGUCAUCU	CUGAUGA	X	GAA	AGUGAUAC	GUAUCACUC	AGAUGACA
	4235	CGCUGGAG	CUGAUGA	X	GAA	ACACGGUG	CACCGUGUA	CUCCAGCG
	4238	CGUCGCUG	CUGAUGA	X	GAA	AGUACACG	CGUGUACUC	CAGCGACG
	4257	AUCUUUAA	CUGAUGA	X	GAA	AGUCCUGC	GCAGGACUU	UUAAGAU
	4258	CAUCUUUA	CUGAUGA	X	GAA	AAGUCCUG	CAGGACUUU	UAAAGAUG
30	4259	CCAUCUUU	CUGAUGA	X	GAA	AAAGUCCU	AGGACUUUU	AAAGAUGG

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	4260	ACCAUCUU	CUGAUGA	X	GAA	AAAAGUCC	GGACUUUUA	AAGAUGGU
	4281	UCAGCGUG	CUGAUGA	X	GAA	ACUGCAGC	GCUGCAGUU	CACGCUGA
	4282	GUCAGCGU	CUGAUGA	X	GAA	AACUGCAG	CUGCAGUUC	ACGCUGAC
	4292	UGGUCCCU	CUGAUGA	X	GAA	AGUCAGCG	CGCUGACUC	AGGGACCA
5	4311	CAGGAGGU	CUGAUGA	X	GAA	AGCUGCAG	CUGCAGCUC	ACCUCCUG
	4316	UUAACAG	CUGAUGA	X	GAA	AGGUGAGC	GCUCACCUC	CUGUUUAA
	4321	UCCAUUUA	CUGAUGA	X	GAA	ACAGGAGG	CCUCCUGUU	UAAAUGGA
	4322	UCCAUUU	CUGAUGA	X	GAA	AACAGGAG	CUCCUGUUU	AAAUGGAA
	4323	CUCCAUI	CUGAUGA	X	GAA	AAACAGGA	UCCUGUUUA	AAUGGAAG
10	4336	CGGGACAG	CUGAUGA	X	GAA	ACCACUUC	GAAGUGGUC	CUGUCCCG
	4341	GGAGCCGG	CUGAUGA	X	GAA	ACAGGACC	GGUCCUGUC	CCGGCUCC
	4348	UGGGGGCG	CUGAUGA	X	GAA	AGCCGGGA	UCCCGGCUC	CGCCCCCA
	4360	AUUUCCAG	CUGAUGA	X	GAA	AGUUGGGG	CCCCAACUC	CUGGAAAU
	4369	UCUCUCGU	CUGAUGA	X	GAA	AUUUCCAG	CUGGAAAU	ACGAGAGA
15	4387	GAAAAUCU	CUGAUGA	X	GAA	AGCAGCAC	GUGCUGCUU	AGAUUUUC
	4388	UGAAAAUC	CUGAUGA	X	GAA	AAGCAGCA	UGCUGCUUA	GAUUUUCA
	4392	CACUUGAA	CUGAUGA	X	GAA	AUCUAAGC	GCUUAGAUU	UUCAAGUG
	4393	ACACUUGA	CUGAUGA	X	GAA	AAUCUAAG	CUUAGAUUU	UCAAGUGU
	4394	AACACUUG	CUGAUGA	X	GAA	AAAUCUAA	UUAGAUUUU	CAAGUGUU
20	4395	CAACACUU	CUGAUGA	X	GAA	AAAUCUA	UAGAUUUUC	AAGUGUUG
	4402	GAAAGAAC	CUGAUGA	X	GAA	ACACUUGA	UCAAGUGUU	GUUCUUUC
	4405	GUGGAAAG	CUGAUGA	X	GAA	ACAACACU	AGUGUUGUU	CUUCCAC
	4406	GGUGGAAA	CUGAUGA	X	GAA	AACAACAC	GUGUUGUUC	UUUCCACC
	4408	GUGGUGGA	CUGAUGA	X	GAA	AGAACAAC	GUUGUUCUU	UCCACCAC
25	4409	GGUGGUGG	CUGAUGA	X	GAA	AAGAACAA	UUGUUCUUU	CCACCACC
	4410	GGGUGGUG	CUGAUGA	X	GAA	AAAGAACA	UGUUCUUUC	CACCACCC
	4425	AAUGUGGC	CUGAUGA	X	GAA	ACUCCGG	CCGGAAGUA	GCCACAUU
	4433	GAAAAUCA	CUGAUGA	X	GAA	AUGUGGCU	AGCCACAUU	UGAUUUUC
	4434	UGAAAAUC	CUGAUGA	X	GAA	AAUGUGGC	GCCACAUUU	GAUUUUCA
30	4438	AAAUGAA	CUGAUGA	X	GAA	AUCAAAUG	CAUUUGAUU	UUCAUUUU

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	4439	AAAAAUGA	CUGAUGA	X	GAA	AAUCAAAU	AUUUGAUUU	UCAUUUUU
	4440	CAAAAAUG	CUGAUGA	X	GAA	AAAUCAAA	UUUGAUUUU	CAUUUUUG
	4441	CCAAAAAU	CUGAUGA	X	GAA	AAAAUCA	UUGAUUUUC	AUUUUUGG
	4444	CCUCCAAA	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAUU	UUUGGAGG
5	4445	UCCUCCAA	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUU	UUGGAGGA
	4446	CUCCUCCA	CUGAUGA	X	GAA	AAAUGAAA	UUUCAUUUU	UGGAGGAG
	4447	CCUCCUCC	CUGAUGA	X	GAA	AAAUGAA	UUCAUUUUU	GGAGGAGG
	4461	UGCAGUCU	CUGAUGA	X	GAA	AGGUCCCU	AGGGACCUC	AGACUGCA
	4477	CUGAGGAC	CUGAUGA	X	GAA	AGCUCCUU	AAGGAGCUU	GUCCUCAG
10	4480	GCCCUGAG	CUGAUGA	X	GAA	ACAAGCUC	GAGCUUGUC	CUCAGGGC
	4483	AAUGCCCU	CUGAUGA	X	GAA	AGGACAAG	CUUGUCCUC	AGGGCAUU
	4491	UCUCUGGA	CUGAUGA	X	GAA	AUGCCCUG	CAGGGCAUU	UCCAGAGA
	4492	UUCUCUGG	CUGAUGA	X	GAA	AAUGCCCU	AGGGCAUUU	CCAGAGAA
	4493	CUUCUCUG	CUGAUGA	X	GAA	AAAUGCCC	GGGCAUUUC	CAGAGAAG
15	4525	GUAGAGUC	CUGAUGA	X	GAA	ACACAUUC	GAAUGUGUU	GACUCUAC
	4530	AGAGAGUA	CUGAUGA	X	GAA	AGUCAACA	UGUUGACUC	UACUCUCU
	4532	AAAGAGAG	CUGAUGA	X	GAA	AGAGUCAA	UUGACUCUA	CUCUCUUU
	4535	GGAAAAGA	CUGAUGA	X	GAA	AGUAGAGU	ACUCUACUC	UCUUUJCC
	4537	AUGGAAAA	CUGAUGA	X	GAA	AGAGUAGA	UCUACUCUC	UUUUCCA
20	4539	GAAUGGAA	CUGAUGA	X	GAA	AGAGAGUA	UACUCUCUU	UUCCAUUC
	4540	UGAAUGGA	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUU	UCCAUUCA
	4541	AUGAAUGG	CUGAUGA	X	GAA	AAAGAGAG	CUCUCUUUU	CCAUUCAU
	4542	AAUGAAUG	CUGAUGA	X	GAA	AAAAGAGA	UCUCUUUUC	CAUUCAUU
	4546	UUUAAAUG	CUGAUGA	X	GAA	AUGGAAAA	UUUUCCA	CAUUUAAA
25	4547	UUUUAAAU	CUGAUGA	X	GAA	AAUGGAAA	UUUCCA	AUUUAAAA
	4550	GACUUUUA	CUGAUGA	X	GAA	AUGAAUGG	CCAUUCAUU	UAAAAGUC
	4551	GGACUUUU	CUGAUGA	X	GAA	AAUGAAUG	CAUUCAUUU	AAAAGUCC
	4552	AGGACUUU	CUGAUGA	X	GAA	AAAUGAAU	AUUCAUUUA	AAAGUCCU
	4558	UUUAUAG	CUGAUGA	X	GAA	ACUUUUAA	UUAAAAGUC	CUAUUAAA
30	4561	ACAUUUA	CUGAUGA	X	GAA	AGGACUUU	AAAGUCCUA	UAUAAUGU

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	4563	GCACAUUA	CUGAUGA	X	GAA	AUAGGACU	AGUCCUAUA	UAAUGUGC
	4565	GGGCACAU	CUGAUGA	X	GAA	AUAUAGGA	UCCUAUAUA	AUGUGCCC
	4583	GGUAGUGA	CUGAUGA	X	GAA	ACCACAGC	GCUGUGGUC	UCACUACC
	4585	CUGGUAGU	CUGAUGA	X	GAA	AGACCACA	UGUGGUCUC	ACUACCAG
5	4589	UUAACUGG	CUGAUGA	X	GAA	AGUGAGAC	GUCUCACUA	CCAGUUAA
	4595	UUUGCUUU	CUGAUGA	X	GAA	ACUGGUAG	CUACCAGUU	AAAGCAAA
	4596	UUUUGCUU	CUGAUGA	X	GAA	AACUGGUA	UACCAGUUA	AAGCAAAA
	4609	GUGUUUGA	CUGAUGA	X	GAA	AGUCUUUU	AAAAGACUU	UCAAACAC
	4610	CGUGUUUG	CUGAUGA	X	GAA	AAGUCUUU	AAAGACUUU	CAAACACG
10	4611	ACGUGUUU	CUGAUGA	X	GAA	AAAGUCUU	AAGACUUUC	AAACACGU
	4625	GGAGGACA	CUGAUGA	X	GAA	AGUCCACG	CGUGGACUC	UGUCCUCC
	4629	UCUUGGAG	CUGAUGA	X	GAA	ACAGAGUC	GACUCUGUC	CUCCAAGA
	4632	ACUUCUUG	CUGAUGA	X	GAA	AGGACAGA	UCUGUCCUC	CAAGAAGU
	4654	GUUUCACA	CUGAUGA	X	GAA	AGGUGCCG	CGGCACCUC	UGUGAAAC
15	4668	GCCCAUUC	CUGAUGA	X	GAA	AUCCAGUU	AACUGGAUC	GAAUGGGC
	4683	AACACACA	CUGAUGA	X	GAA	AGCAUUGC	GCAAUGCUU	UGUGUGUU
	4684	CAACACAC	CUGAUGA	X	GAA	AAGCAUUG	CAAUGCUUU	GUGUGUUG
	4691	CCAUCCUC	CUGAUGA	X	GAA	ACACACAA	UUGUGUGUU	GAGGAUGG
	4709	GGCCCUUG	CUGAUGA	X	GAA	ACAUCUCA	UGAGAUGUC	CCAGGGCC
20	4722	GGUAGACA	CUGAUGA	X	GAA	ACUCGGCC	GGCCGAGUC	UGUCUACC
	4726	CCAAGGUA	CUGAUGA	X	GAA	ACAGACUC	GAGUCUGUC	UACCUUGG
	4728	CUCCAAGG	CUGAUGA	X	GAA	AGACAGAC	GUCUGUCUA	CCUUGGAG
	4732	AAGCCUCC	CUGAUGA	X	GAA	AGGUAGAC	GUCUACCUU	GGAGGCUU
	4740	CCUCCACA	CUGAUGA	X	GAA	AGCCUCCA	UGGAGGCUU	UGUGGAGG
25	4741	UCCUCCAC	CUGAUGA	X	GAA	AAGCCUCC	GGAGGCUUU	GUGGAGGA
	4758	UUGGCUCA	CUGAUGA	X	GAA	AGCCCGCA	UGC GGGCUA	UGAGCCAA
	4771	CCACACUU	CUGAUGA	X	GAA	ACACUUGG	CCAAGUGUU	AAGUGUGG
	4772	CCCACACU	CUGAUGA	X	GAA	AACACUUG	CAAGUGUUA	AGUGUGGG
	4811	CUCCGAGC	CUGAUGA	X	GAA	ACUUGCGC	GCGCAAGUC	GCUCGGAG
30	4815	CGCUCUCC	CUGAUGA	X	GAA	AGCGACUU	AAGUCGCUC	GGAGAGCG

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	4826	CAGGCUCC	CUGAUGA	X	GAA	ACCGCUCU	AGAGCGGUU	GGAGCCUG
	4844	GCCAGCAC	CUGAUGA	X	GAA	AUGCAUCU	AGAUGCAUU	GUGCUGGC
	4854	CUCCACCA	CUGAUGA	X	GAA	AGCCAGCA	UGCUGGCUC	UGGUGGAG
	4870	CAGGCCAC	CUGAUGA	X	GAA	AGCCCACC	GGUGGGCUU	GUGGCCUG
5	4880	CGUUUCCU	CUGAUGA	X	GAA	ACAGGCCA	UGGCCUGUC	AGGAAACG
	4908	CAAAACCA	CUGAUGA	X	GAA	ACCCUGCC	GGCAGGGUU	UGGUUUUG
	4909	CCAAAACC	CUGAUGA	X	GAA	AACCCUGC	GCAGGGUUU	GGUUUUUGG
	4913	CCUUCCAA	CUGAUGA	X	GAA	ACCAAACC	GGUUUGGUU	UUGGAAGG
	4914	ACCUUCCA	CUGAUGA	X	GAA	AACCAAAC	GUUUGGUUU	UGGAAGGU
10	4915	AACCUUCC	CUGAUGA	X	GAA	AAACCAAA	UUUGGUUUU	GGAAGGUU
	4923	AGCACGCA	CUGAUGA	X	GAA	ACCUUCCA	UGGAAGGUU	UGCGUGCUC
	4924	GAGCACGC	CUGAUGA	X	GAA	AACCUUCC	GGAAGGUUU	GCGUGCUC
	4932	ACUGUGAA	CUGAUGA	X	GAA	AGCACGCA	UGCGUGCUC	UUCACAGU
	4934	CGACUGUG	CUGAUGA	X	GAA	AGAGCACG	CGUGCUCUU	CACAGUCG
15	4935	CCGACUGU	CUGAUGA	X	GAA	AAGAGCAC	GUGCUCUUC	ACAGUCGG
	4941	UGUAACCC	CUGAUGA	X	GAA	ACUGUGAA	UUCACAGUC	GGGUUACA
	4946	UCGCCUGU	CUGAUGA	X	GAA	ACCCGACU	AGUCGGGUU	ACAGGCGA
	4947	CUCGCCUG	CUGAUGA	X	GAA	AACCCGAC	GUCGGGUUA	CAGGCGAG
	4957	CCACAGGG	CUGAUGA	X	GAA	ACUCGCCU	AGGCGAGUU	CCCUGUGG
20	4958	GCCACAGG	CUGAUGA	X	GAA	AACUCGCC	GGCGAGUUC	CCUGUGGC
	4969	GAGUAGGA	CUGAUGA	X	GAA	ACGCCACA	UGUGGCGUU	UCCUACUC
	4970	GGAGUAGG	CUGAUGA	X	GAA	AACGCCAC	GUGGCGUUU	CCUACUCC
	4971	AGGAGUAG	CUGAUGA	X	GAA	AAACGCCA	UGGCGUUUC	CUACUCCU
	4974	AUUAGGAG	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUA	CUCCUAAU
25	4977	CUCAUJAG	CUGAUGA	X	GAA	AGUAGGAA	UCCUACUC	CUAAUGAG
	4980	ACUCUCAU	CUGAUGA	X	GAA	AGGAGUAG	CUACUCCUA	AUGAGAGU
	4989	CCGGAAGG	CUGAUGA	X	GAA	ACUCUCAU	AUGAGAGUU	CCUCCGGG
	4990	UCCGGAAG	CUGAUGA	X	GAA	AACUCUCA	UGAGAGUUC	CUCCGGA
	4993	GAGUCCGG	CUGAUGA	X	GAA	AGGAACUC	GAGUCCUU	CCGGACUC
30	4994	AGAGUCCG	CUGAUGA	X	GAA	AAGGAACU	AGUCCUUC	CGGACUCU

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	5001	ACACGUAA	CUGAUGA	X	GAA	AGUCCGGA	UCCGGACUC	UUACGUGU
	5003	AGACACGU	CUGAUGA	X	GAA	AGAGUCCG	CGGACUCUU	ACGUGUCU
	5004	GAGACACG	CUGAUGA	X	GAA	AAGAGUCC	GGACUCUUA	CGUGUCUC
	5010	GGCCAGGA	CUGAUGA	X	GAA	ACACGUAA	UUACGUGUC	UCCUGGCC
5	5012	CAGGCCAG	CUGAUGA	X	GAA	AGACACGU	ACGUGUCUC	CUGGCCUG
	5046	GAAGGAGC	CUGAUGA	X	GAA	AGCUGCAU	AUGCAGCUU	GCUCCUUC
	5050	UGAGGAAG	CUGAUGA	X	GAA	AGCAAGCU	AGCUUGCUC	CUUCCUCA
	5053	AGAUGAGG	CUGAUGA	X	GAA	AGGAGCAA	UUGCUCUUU	CCUCAUCU
	5054	GAGAUGAG	CUGAUGA	X	GAA	AAGGAGCA	UGCUCUUC	CUCAUCUC
10	5057	UGAGAGAU	CUGAUGA	X	GAA	AGGAAGGA	UCCUUCUC	AUCUCUCA
	5060	GCCUGAGA	CUGAUGA	X	GAA	AUGAGGAA	UUCCUCAUC	UCUCAGGC
	5062	CAGCCUGA	CUGAUGA	X	GAA	AGAUGAGG	CCUCAUCUC	UCAGGCUG
	5064	CACAGCCU	CUGAUGA	X	GAA	AGAGAUGA	UCAUCUCUC	AGGCUGUG
	5076	UCUGAAU	CUGAUGA	X	GAA	AGGCACAG	CUGUGCCUU	AAUUCAGA
15	5077	UUCUGAAU	CUGAUGA	X	GAA	AAGGCACA	UGUGCCUUA	AUUCAGAA
	5080	GUGUUCUG	CUGAUGA	X	GAA	AUUAAGGC	GCCUUAUU	CAGAACAC
	5081	GGUGUUCU	CUGAUGA	X	GAA	AAUUAAGG	CCUUAUUU	AGAACACC
	5105	CCUCUGCC	CUGAUGA	X	GAA	ACGUUCCU	AGGAACGUC	GGCAGAGG
	5116	CCCGUCAG	CUGAUGA	X	GAA	AGCCUCUG	CAGAGGCUC	CUGACGGG
20	5135	GUUCUCAC	CUGAUGA	X	GAA	AUUCUUCG	CGAAGAAU	GUGAGAAC
	5156	GAAACCCU	CUGAUGA	X	GAA	AGUUUCUG	CAGAAACUC	AGGGUUUC
	5162	CCAGCAGA	CUGAUGA	X	GAA	ACCCUGAG	CUCAGGGUU	UCUGCUGG
	5163	CCCAGCAG	CUGAUGA	X	GAA	AACCCUGA	UCAGGGUUU	CUGCUGGG
	5164	ACCCAGCA	CUGAUGA	X	GAA	AAACCCUG	CAGGGUUUC	UGCUGGGU
25	5203	AACCCUCA	CUGAUGA	X	GAA	ACCUGCCA	UGGCAGGUC	UGAGGGUU
	5211	UGACAGAG	CUGAUGA	X	GAA	ACCCUCAG	CUGAGGGUU	CUCUGUCA
	5212	UUGACAGA	CUGAUGA	X	GAA	AACCCUCA	UGAGGGUUC	UCUGUCA
	5214	ACUUGACA	CUGAUGA	X	GAA	AGAACCCU	AGGGUUCUC	UGUCAAGU
	5218	CGCCACUU	CUGAUGA	X	GAA	ACAGAGAA	UUCUCUGUC	AAGUGGCG
30	5229	UGAGCCUU	CUGAUGA	X	GAA	ACCGCCAC	GUGGCGGUA	AAGGCUCA



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	5236	ACCAGCCU	CUGAUGA	X	GAA	AGCCUUUA	UAAAGGCUC	AGGCUGGU
	5247	AGAGGAAG	CUGAUGA	X	GAA	ACACCAGC	GCUGGUGUU	CUUCCUCU
	5248	UAGAGGAA	CUGAUGA	X	GAA	AACACCAG	CUGGUGUUC	UUCCUCUA
	5250	GAUAGAGG	CUGAUGA	X	GAA	AGAACACC	GGUGUUCUU	CCUCUAUC
5	5251	AGAUAGAG	CUGAUGA	X	GAA	AAGAACAC	GUGUUCUUC	CUCUAUCU
	5254	UGGAGAUU	CUGAUGA	X	GAA	AGGAAGAA	UUCUUCCUC	UAUCUCCA
	5256	AGUGGAGA	CUGAUGA	X	GAA	AGAGGAAG	CUUCCUCUA	UCUCCACU
	5258	GGAGUGGA	CUGAUGA	X	GAA	AUAGAGGA	UCCUCUAUC	UCCACUCC
	5260	CAGGAGUG	CUGAUGA	X	GAA	AGAUAGAG	CUCUAUCUC	CACUCCUG
10	5265	CCUGACAG	CUGAUGA	X	GAA	AGUGGAGA	UCUCCACUC	CUGUCAGG
	5270	GGGGGCCU	CUGAUGA	X	GAA	ACAGGAGU	ACUCCUGUC	AGGCCCCC
	5283	AUACUGAG	CUGAUGA	X	GAA	ACUUGGGG	CCCCAAGUC	CUCAGUAU
	5286	AAAAUACU	CUGAUGA	X	GAA	AGGACUUG	CAAGUCCUC	AGUAUUUU
	5290	AGCUAAAA	CUGAUGA	X	GAA	ACUGAGGA	UCCUCAGUA	UUUUAGCU
15	5292	AAAGCUAA	CUGAUGA	X	GAA	AUACUGAG	CUCAGUAUU	UUAGCUUU
	5293	CAAAGCUA	CUGAUGA	X	GAA	AAUACUGA	UCAGUAUUU	UAGCUUUG
	5294	ACAAAGCU	CUGAUGA	X	GAA	AAAUACUG	CAGUAUUUU	AGCUUUGU
	5295	CACAAAGC	CUGAUGA	X	GAA	AAAAUACU	AGUAUUUUA	GCUUUGUG
	5299	AAGCCACA	CUGAUGA	X	GAA	AGCUAAAA	UUUUAGCUU	UGUGGCUU
20	5300	GAAGCCAC	CUGAUGA	X	GAA	AAGCUAAA	UUUAGCUUU	GUGGCUUC
	5307	CCAUCAGG	CUGAUGA	X	GAA	AGCCACAA	UUGUGGCUU	CCUGAUGG
	5308	GCCAUCAG	CUGAUGA	X	GAA	AAGCCACA	UGUGGCUUC	CUGAUGGC
	5325	CCAAUUAA	CUGAUGA	X	GAA	AUUUUUCU	AGAAAAAUC	UUAAUUGG
	5327	AACCAAUU	CUGAUGA	X	GAA	AGAUUUUU	AAAAAUCUU	AAUUGGUU
25	5328	CAACCAAU	CUGAUGA	X	GAA	AAGAUUUU	AAAAUCUUA	AUUGGUUG
	5331	AACCAACC	CUGAUGA	X	GAA	AUUAAGAU	AUCUUAAUU	GGUUGGUU
	5335	AGCAAACC	CUGAUGA	X	GAA	ACCAAUUA	UAAUUGGUU	GGUUUGCU
	5339	GGAGAGCA	CUGAUGA	X	GAA	ACCAACCA	UGGUUGGUU	UGCUCUCC
	5340	UGGAGAGC	CUGAUGA	X	GAA	AACCAACC	GGUUGGUUU	GCUCUCCA
30	5344	UAUCUGGA	CUGAUGA	X	GAA	AGCAAACC	GGUUGGCUC	UCCAGAUU

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	5346	AUUAUCUG	CUGAUGA	X	GAA	AGAGCAAA	UUUGCUCUC	CAGAUAAU
	5352	CUAGUGAU	CUGAUGA	X	GAA	AUCUGGAG	CUCCAGAU	AUCACUAG
	5355	UGGCUAGU	CUGAUGA	X	GAA	AUUAUCUG	CAGAUAAUC	ACUAGCCA
	5359	AAUCUGGC	CUGAUGA	X	GAA	AGUGAUUA	UAAUCACUA	GCCAGAUU
5	5367	AAUUUCGA	CUGAUGA	X	GAA	AUCUGGCU	AGCCAGAUU	UCGAAAUU
	5368	UAAUUUCG	CUGAUGA	X	GAA	AAUCUGGC	GCCAGAUUU	CGAAAUUA
	5369	GUAUUUUC	CUGAUGA	X	GAA	AAAUCUGG	CCAGAUUUC	GAAAUUAC
	5375	UAAAAAGU	CUGAUGA	X	GAA	AUUUCGAA	UUCGAAAUU	ACUUUUUA
	5376	CUAAAAAG	CUGAUGA	X	GAA	AAUUUCGA	UCGAAAUUA	CUUUUUAG
10	5379	CGGCUAAA	CUGAUGA	X	GAA	AGUAAUUU	AAAUUACUU	UUUAGCCG
	5380	UCGGCUAA	CUGAUGA	X	GAA	AAGUAAUU	AAUUACUUU	UUAGCCGA
	5381	CUCGGCUA	CUGAUGA	X	GAA	AAAGUAAU	AUUACUUUU	UAGCCGAG
	5382	CCUCGGCU	CUGAUGA	X	GAA	AAAAGUAA	UUACUUUUU	AGCCGAGG
	5383	ACCUCGGC	CUGAUGA	X	GAA	AAAAAGUA	UACUUUUUA	GCCGAGGU
15	5392	GUUAUCAU	CUGAUGA	X	GAA	ACCUCGGC	GCCGAGGUU	AUGAUAAC
	5393	UGUUAUCA	CUGAUGA	X	GAA	AACCUCGG	CCGAGGUUA	UGAUAAAC
	5398	GUAGAUGU	CUGAUGA	X	GAA	AUCAUAAU	GUUAUGAU	ACAUCUAC
	5403	AUACAGUA	CUGAUGA	X	GAA	AUGUUAUC	GAUAACAUC	UACUGUAU
	5405	GGAUACAG	CUGAUGA	X	GAA	AGAUGUUA	UAACAUCUA	CUGUAUCC
20	5410	CUAAAGGA	CUGAUGA	X	GAA	ACAGUAGA	UCUACUGUA	UCCUUUAG
	5412	UUCUAAAG	CUGAUGA	X	GAA	AUACAGUA	UACUGUAUC	CUUUAGAA
	5415	AAAUUCUA	CUGAUGA	X	GAA	AGGAUACA	UGUAUCCUU	UAGAAUUU
	5416	AAAAUUCU	CUGAUGA	X	GAA	AAGGAUAC	GUAUCCUUU	AGAAUUUU
	5417	UAAAAUUC	CUGAUGA	X	GAA	AAAGGAUA	UAUCCUUUA	GAAUUUUU
25	5422	UAGGUUAA	CUGAUGA	X	GAA	AUUCUAAA	UUUAGAAUU	UUAAACCUA
	5423	AUAGGUUA	CUGAUGA	X	GAA	AAUUCUAA	UUAGAAUUU	UAACCUAU
	5424	UAUAGGUU	CUGAUGA	X	GAA	AAAUUCUA	UAGAAUUUU	AACCUAUA
	5425	UUAUAGGU	CUGAUGA	X	GAA	AAAAUUCU	AGAAUUUUU	ACCUAUAA
	5430	UAGUUUUA	CUGAUGA	X	GAA	AGGUUAAA	UUUAACCUA	UAAAACUA
30	5432	CAUAGUUU	CUGAUGA	X	GAA	AUAGGUUA	UAACCUAUA	AAACUAUG

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5438 AGUAGACA CUGAUGA X GAA AGUUUUU AUAAAACUA UGUCUACU  
5442 AACCAGUA CUGAUGA X GAA ACAUAGUU AACUAUGUC UACUGGUU  
5444 GAAACCAG CUGAUGA X GAA AGACAUAG CUAUGUCUA CUGGUUUC  
5450 CAGGCAGA CUGAUGA X GAA ACCAGUAG CUACUGGUU UCUGCCUG  
5 5451 ACAGGCAG CUGAUGA X GAA AACCAGUA UACUGGUUU CUGCCUGU  
5452 CACAGGCA CUGAUGA X GAA AAACCAGU ACUGGUUUC UGCCUGUG

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be  $\geq 2$  base-pairs.

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Table VII: Mouse *flk-1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequences

nt. Posi- tion	HP Ribozyme Sequence	Substrate
5	GGGACACA AGAA GGGCCC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GGGCCCC GAC UGUGUCCC
88	GUUAUCCC AGAA GCGGGA ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	UCCCCGA GCC GGGAUAAAC
105	GGAAUCGG AGAA GCCAGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CCUGGCU GAC CCGAUUCC
110	UCCGCGGA AGAA GUUCAG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CUGACCC GAU UCCGCGGA
125	CGGCUGUC AGAA GUGUCC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GGACACC GCU GACAGCCG
10	132 CCAGCCGC AGAA GUCAGC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GCUGACA GCC GCGGCUGG
138	CUGGCUCC AGAA GCGGCU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AGCCGCG GCU GGAGCCAG
175	CAGCGCAA AGAA GGGGAG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CUCCCCG GUC UUGCGCUG
199	GUCACAGA AGAA GUAUGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CCAUACC GCC UCUGUGAC
309	CACAGAGC AGAA GCUAGC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GCUAGCU GUC GCUCUGUG
15	342 CCCACAGA AGAA GCUCGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CCGAGCC GCC UCUGUGGG
434	UGCAAGUA AGAA GAAGGG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CCCUUCA GAU UACUUGCA
630	UAGACAUU AGAA GUGGAG ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	CUCCACU GUU UAUGUCUA
655	GAAUGGUG AGAA GUAAUC ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	GAUUACA GAU CACCAUUC
739	CGACCCUC AGAA GGGGAU ACCAGAGAAACACACGUGUGGUACAUAUACCUGGUA	AUCCCCU GCC GAGGGUCG

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807	CUGUUUCC AGAA GGAACA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UGUUTCCG GAU GGAAACAG
920	ACAUGAUA AGAA GAUAGG ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	CCUAUCA GUC UAUCAUGU
1002	UUUUCUCC AGAA GAUAGC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GCUAUCU GCC GGAGAAAA
1229	UCUUGAUC AGAA GUCCAC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GUGGAGC GAU GAUCAAGA
5 1365	AUAUCAGG AGAA GGUUAA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UUACCCA GCU CCUGAUUAU
1556	UCUCACCG AGAA GGGUG ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	CACCCCA GAU CGGUGAGA
1629	UUGGCGUA AGAA GUGCAU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AUGCACA GUC UACGCCAA
1687	UCUGUAGG AGAA GGUUC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GAAGCCU GCU CCUACAGA
1696	UUGGCCCG AGAA GUAGGA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UCCUACA GAC CCGGCCAA
10 1796	UUCUUUCA AGAA GGGCAU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AUGCCCU GAU UGAAGGAA
1950	GGCUGGGC AGAA GGUUGC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GCAACCU GCU GCCCAGCC
1953	GUUGGCUG AGAA GCAGGU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	ACCUGCU GCC CAGCCAAC
1985	CAGUGCAC AGAA GGGACA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UGUCCCU GUU GUGCACUG
2055	CCCAUGUG AGAA GAUGUU ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	AACAUCG GUC CACAUGGG
15 2082	UUCUUGCA AGAA GGUGUG ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	CACACCA GUU UGCAAGAA
2208	UUAUCUUG AGAA GAGCAA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UUGCUCU GCU CAAGAUA
2252	GGAUGAUG AGAA GUUUGA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UCAAACA GCU CAUCAUCC
2444	UGCGGAUA AGAA GGUUCC ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	GGAACCU GAC UAUCCGCA
2639	GCUUAACG AGAA GUAGGA ACCAGAGAAAACACACGUGUGGUACAUAUACCUGGUA	UCCUACG GAC CGUUAAGC

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2703	GGCAAUUC AGAA GGAUCC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GGAUCCA GAU GAAUUGCC
2777	CUAGUUUC AGAA GGUCCC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GGGACCG GCU GAAACUAG
2832	CCAAAAGC AGAA GCCUCA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UGAGGCA GAC GCUUUUGG
3199	AAAGCCUG AGAA GGCAGA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UCUGCCA GCU CAGGCUUU
5 3278	GCUCCAAAG AGAA GGAAGU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	ACUUCU GAC CUUGGAGC
3304	CACUUGGA AGAA GUAACA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UGUUACA GCU UCCAAGUG
3421	CCGGGCCA AGAA GAAGUC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GACUUCG GCU UGGCCCCG
3450	CUGACAUU AGAA GGGUCU ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	AGACCCG GAU UAUGUCAG
3475	CAAAGGGA AGAA GGCAUC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GAUGCCC GAC UCCCCUUG
10 3663	GUAGUGUA AGAA GGAGCC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GGCUCCU GAC UACACUAC
3689	CCAGCAUG AGAA GGUACA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UGUACCA GAC CAUGCUGG
3703	CUCAUGCC AGAA GUCCAG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CUGGACU GCU GGCAUGAG
3860	GUGAGGUA AGAA GGGAGA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UCUCCCU GCC UACCUCAC
3873	AUACAGGA AGAA GGUGAG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CUCACCU GUU UCCUGUAU
15 4038	UGGCUGUC AGAA GGAUC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GAUCCCA GAU GACAGCCA
4181	AGCCACUG AGAA GGUUGG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CCAACCA GAC CAGUGGCU
4196	GAUACCCA AGAA GGUAGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GCUACCA GUC UGGGUAUC
4212	UCUGUGUC AGAA GAGUGA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UCACUCA GAU GACACAGA
4278	UCAGCGUG AGAA GCAGCA ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UGCUGCA GUU CAGGCUGA

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4287 GUCCCCUGA AGAA GCGUGA ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA UCACGCU GAC UCAGGGGAC  
 4307 AGGAGGUG AGAA GCAGUG ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA CACUGCA GCU CACCUCU  
 4318 UCCAUUUA AGAA GGAGGU ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA ACCUCCU GUU UAAAUGGA  
 4338 GGAGCCGG AGAA GGACCA ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA UGGUCCU GUC CCGGCUCC  
 5 4344 GGGGGCGG AGAA GGGACA ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA UGUCCCG GCU CCGCCCCC  
 4349 GAGUUGGG AGAA GAGCCG ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA CGGCUCC GCC CCCAACUC  
 4383 AAAAUCUA AGAA GCACCU ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA AGGUGCU GCU UAGAUAUUU  
 4462 UCCUUGCA AGAA GAGGUC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA GACCUCA GAC UGCAAGGA  
 4574 GAGACCAC AGAA GGGCAC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA GUGCCCU GCU GUGGUCUC  
 10 4626 UCUUGGAG AGAA GAGUCC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA GGACUCU GUC CUCCAAGA  
 4723 CCAAGGUA AGAA GACUCG ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA CGAGUCU GUC UACCUUGG  
 4823 CAGGCUCC AGAA GCUCUC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA GAGAGCG GUU GGAGCCUG  
 4836 CACAAUGC AGAA GCAGGC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA GCCUGCA GAU GCAUUGUG  
 4896 ACCCUGCC AGAA GCCUUU ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA AAAGGCG GCC GGCAGGGU  
 15 4938 UGUAAACC AGAA GUGAAG ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA CUUCACA GUC GGGUUACA  
 4996 ACGUAAGA AGAA GGAAGG ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA CCUCCG GAC UCUUACGU  
 5042 AAGGAGCA AGAA GCAUCA ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA UGAUGCA GCU UGCUCU  
 5118 UCGGCCCC AGAA GGAGCC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA GGCUCU GAC GGGGCCGA  
 5165 CUCCACCC AGAA GAAACC ACCAGAGAAAACACACGUUGUGGUACAUAUACCUGGUA GGUUUU GCU GGGUGGAG

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5310	UUUCUGCC AGAA GGAAGC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GCUUCCU GAU GGCAGAAA
5363	AUUUCGAA AGAA GGCUAG ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CUAGCCA GAU UUCGAAAU
5453	AGCACACA AGAA GAAACC ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GGUUUCU GCC UGUGUGCU



Table VIII: Mouse *flt-1* VEGF Receptor-Hammerhead Ribozyme and Substrate Sequence

	nt. Posi- tion	HH Ribozyme Sequence	Substrate
5	17	GUGAGCAA CUGAUGA X GAA ACGCGGCC	GGCCGCGUC UUGCUCAC
	19	UGGUGAGC CUGAUGA X GAA AGACGCGG	CCGCGUCUU GCUCACCA
	23	ACCAUGGU CUGAUGA X GAA AGCAAGAC	GUCUUGCUC ACCAUGGU
	32	CAGCAGCU CUGAUGA X GAA ACCAUGGU	ACCAUGGUC AGCUGCUG
10	53	UAAGGCAA CUGAUGA X GAA ACCGCGGU	ACCGCGGUC UUGCCUUA
	55	CGUAAGGC CUGAUGA X GAA AGACCGCG	CGCGGUCUU GCCUUACG
	60	CAGCGCGU CUGAUGA X GAA AGGCAAGA	UCUUGCCUU ACGCGCUG
	61	GCAGCGCG CUGAUGA X GAA AAGGCAAG	CUUGCCUUA CGCGCUGC
	71	AGACACCC CUGAUGA X GAA AGCAGCGC	GCGCUGCUC GGGUGUCU
15	78	GAGAAGCA CUGAUGA X GAA ACACCCGA	UCGGGUGUC UGCUUCUC
	83	CCUGUGAG CUGAUGA X GAA AGCAGACA	UGUCUGCUU CUCACAGG
	84	UCCUGUGA CUGAUGA X GAA AAGCAGAC	GUCUGCUUC UCACAGGA
	86	UAUCCUGU CUGAUGA X GAA AGAAGCAG	CUGCUUCUC ACAGGAUA
	94	CUGAGCCA CUGAUGA X GAA AUCCUGUG	CACAGGAUA UGGCUCAG
20	100	UCGACCCU CUGAUGA X GAA AGCCAUAU	AUAUGGCUC AGGGUCGA
	106	UUAACUUC CUGAUGA X GAA ACCCUGAG	CUCAGGGUC GAAGUUAA
	112	GCACUUUU CUGAUGA X GAA ACUUCGAC	GUCGAAGUU AAAAGUGC
	113	GGCACUUU CUGAUGA X GAA AACUUCGA	UCGAAGUUA AAAGUGCC
	132	GCCUUUUA CUGAUGA X GAA ACUCAGUU	AACUGAGUU UAAAAGGC
25	133	UGCCUUUU CUGAUGA X GAA AACUCAGU	ACUGAGUUU AAAAGGCA
	134	GUGCCUUU CUGAUGA X GAA AAACUCAG	CUGAGUUUA AAAGGCAC
	152	GCUUGCAU CUGAUGA X GAA ACAUGCUG	CAGCAUGUC AUGCAAGC
	171	GAGAAAGA CUGAUGA X GAA AGUCUGGC	GCCAGACUC UCUUCUC
	173	UUGAGAAA CUGAUGA X GAA AGAGUCUG	CAGACUCUC UUUCUCAA
30	175	ACUUGAGA CUGAUGA X GAA AGAGAGUC	GACUCUCUU UCUCAAGU
	176	CACUUGAG CUGAUGA X GAA AAGAGAGU	ACUCUCUUU CUCAAGUG
	177	GCACUUGA CUGAUGA X GAA AAAGAGAG	CUCUCUUUC UCAAGUGC

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179	CUGCACUU	CUGAUGA	X	GAA	AGAAAGAG	CUCUUUCUC	AAGUGCAG
205	GAGACCAU	CUGAUGA	X	GAA	AGUGGGCU	AGCCCACUC	AUGGUCUC
211	UGGGCAGA	CUGAUGA	X	GAA	ACCAUGAG	CUCAUGGUC	UCUGCCCA
213	CGUGGGCA	CUGAUGA	X	GAA	AGACCAUG	CAUGGUCUC	UGCCCACG
5 254	GGGGGAGU	CUGAUGA	X	GAA	AUGCUCAG	CUGAGCAUC	ACUCCCCC
258	CGAUGGGG	CUGAUGA	X	GAA	AGUGAUGC	GCAUCACUC	CCCCAUCG
265	CACAGGCC	CUGAUGA	X	GAA	AUGGGGGA	UCCCCCAUC	GGCCUGUG
282	UUGCCUGU	CUGAUGA	X	GAA	AUCCCUCC	GGAGGGUAU	ACAGGCAA
292	UGCUGCAG	CUGAUGA	X	GAA	AUUGCCUG	CAGGCAAUU	CUGCAGCA
10 293	GUGCUGCA	CUGAUGA	X	GAA	AAUUGCCU	AGGCAAUUC	UGCAGCAC
304	CCAAGGUC	CUGAUGA	X	GAA	AGGUGCUG	CAGCACCUU	GACCUUGG
310	CCGUGUCC	CUGAUGA	X	GAA	AGGUCAAG	CUUGACCUU	GGACACGG
341	CAGGUGUA	CUGAUGA	X	GAA	AGGCCCGU	ACGGGCCUC	UACACCUG
343	UACAGGUG	CUGAUGA	X	GAA	AGAGGCCC	GGGCCUCUA	CACCUGUA
15 351	GAGGUAUC	CUGAUGA	X	GAA	ACAGGUGU	ACACCUGUA	GAUACCUC
355	UAGGGAGG	CUGAUGA	X	GAA	AUCUACAG	CUGUAGUAU	CCUCCCUA
359	GAUGUAGG	CUGAUGA	X	GAA	AGGUUAUCU	AGAUACCUC	CCUACAUC
363	AGUAGAUG	CUGAUGA	X	GAA	AGGGAGGU	ACCUCCCUA	CAUCUACU
367	UCGAAGUA	CUGAUGA	X	GAA	AUGUAGGG	CCCUACAUC	UACUUCGA
20 369	CUUCGAAG	CUGAUGA	X	GAA	AGAUGUAG	CUACAUCUA	CUUCGAAG
372	UUUCUUCG	CUGAUGA	X	GAA	AGUAGAUG	CAUCUACUU	CGAAGAAA
373	UUUUCUUC	CUGAUGA	X	GAA	AAGUAGAU	AUCUACUUC	GAAGAAAA
394	AGAUUGAA	CUGAUGA	X	GAA	AUUCCGCU	AGCGGAAUC	UUCAAUCU
396	GUAGAUUG	CUGAUGA	X	GAA	AGAUUCCG	CGGAAUCUU	CAAUCUAC
25 397	UGUAGAUU	CUGAUGA	X	GAA	AAGAUUCC	GGAAUCUUC	AAUCUACA
401	AAUAUGUA	CUGAUGA	X	GAA	AUUGAAGA	UCUUCAAUC	UACAUAAU
403	CAAAUAUG	CUGAUGA	X	GAA	AGAUUGAA	UUCAAUCUA	CAUAUUUG
407	CUAACAAA	CUGAUGA	X	GAA	AUGUAGAU	AUCUACAUA	UUUGUUAG
409	CACUAACA	CUGAUGA	X	GAA	AUAUGUAG	CUACAUAUU	UGUUAGUG
30 410	UCACUAAC	CUGAUGA	X	GAA	AAUAUGUA	UACAUAUUU	GUUAGUGA
413	GCAUCACU	CUGAUGA	X	GAA	ACAAAUAU	AUAUUUGUU	AGUGAUGC
414	UGCAUCAC	CUGAUGA	X	GAA	AACAAUAU	UAUUUGUUA	GUGAUGCA
429	UAUGAAAG	CUGAUGA	X	GAA	ACUCCCUG	CAGGGAGUC	CUUUCAUA

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432	CUCUAUGA CUGAUGA X GAA AGGACUCC	GGAGUCCUU UCAUAGAG
433	UCUCUAUG CUGAUGA X GAA AAGGACUC	GAGUCCUUU CAUAGAGA
434	AUCUCUAU CUGAUGA X GAA AAAGGACU	AGUCCUUUC AUAGAGAU
437	UGCAUCUC CUGAUGA X GAA AUGAAAGG	CCUUUCAUA GAGAUGCA
5 455	AGUUUGGG CUGAUGA X GAA AUGUCAGU	ACUGACAUU CCCAAACU
464	AUGUGCAC CUGAUGA X GAA AGUUUGGG	CCCAAACUU GUGCACAU
491	GGGAUGAU CUGAUGA X GAA AGCUGUCU	AGACAGCUC AUCAUCCC
494	CAGGGGAU CUGAUGA X GAA AUGAGCUG	CAGCUCAUC AUCCCCUG
497	CGGCAGGG CUGAUGA X GAA AUGAUGAG	CUCAUCAUC CCCUGCCG
10 514	CGUUUGGU CUGAUGA X GAA ACGUCACC	GGUGACGUC ACCCAACG
524	GUGACUGU CUGAUGA X GAA ACGUUGGG	CCCAACGUC ACAGUCAC
530	UUUAGGGU CUGAUGA X GAA ACUGUGAC	GUCACAGUC ACCCUAAA
536	AACUUUUU CUGAUGA X GAA AGGGUGAC	GUCACCCUA AAAAAGUU
544	CAAAUGGA CUGAUGA X GAA ACUUUUUU	AAAAAAGUU UCCAUIUG
15 545	UCAAUUGG CUGAUGA X GAA AACUUUUU	AAAAAGUUU CCAUIUGA
546	AUCAAUUG CUGAUGA X GAA AAACUUUU	AAAAGUUUC CAUIUGAU
550	GAGUAUCA CUGAUGA X GAA AUGGAAAC	GUUCCAUU UGAUACUC
551	AGAGUAUC CUGAUGA X GAA AAUGGAAA	UUUCCAUU GAUACUCU
555	GGUAAGAG CUGAUGA X GAA AUCAAUUG	CAUIUGAU CUCUUACC
20 558	AGGGGUAA CUGAUGA X GAA AGUAUCAA	UUGAUACUC UUACCCCU
560	UCAGGGGU CUGAUGA X GAA AGAGUAUC	GAUACUCUU ACCCCUGA
561	AUCAGGGG CUGAUGA X GAA AAGAGUAU	AUACUCUUA CCCUGAU
581	UCCCAUGU CUGAUGA X GAA AUUCUUUG	CAAAGAAUA ACAUGGGA
594	GCCUCUCC CUGAUGA X GAA ACUGUCCC	GGGACAGUA GGAGAGGC
25 604	CUAUUAUA CUGAUGA X GAA AGCCUCUC	GAGAGGCUU UAUAAUAG
605	GCUAUUAU CUGAUGA X GAA AAGCCUCU	AGAGGCUUU AUAAUAGC
606	UGCUAUUA CUGAUGA X GAA AAAGCCUC	GAGGCUUUA UAAUAGCA
608	UUUGCUAU CUGAUGA X GAA AUAAAGCC	GGCUUUAUA AUAGCAAA
611	GCAUIUGC CUGAUGA X GAA AUUAUAAA	UUUAUAAUA GCAAUUGC
30 625	UCUCUUUG CUGAUGA X GAA ACGUUGCA	UGCAACGUA CAAAGAGA
635	AGCAGUCC CUGAUGA X GAA AUCUCUUU	AAAGAGAUU GGACUGCU
662	UGCCCGUU CUGAUGA X GAA ACGGUGGC	GCCACCGUC AACGGGCA
676	UUGUCUGG CUGAUGA X GAA ACAGGUGC	GCACCUGUA CCAGACAA

	688	GGGUCAGA	CUGAUGA	X	GAA	AGUUUGUC	GACAAACUA	UCUGACCC
	690	AUGGGUCA	CUGAUGA	X	GAA	AUAGUUUG	CAAACUAUC	UGACCCAU
	699	GGUCUGCC	CUGAUGA	X	GAA	AUGGGUCA	UGACCCAU	GGCAGACC
	711	UAGGAUUG	CUGAUGA	X	GAA	AUUGGUCU	AGACCAAUA	CAAUCCUA
5	716	ACAUCUAG	CUGAUGA	X	GAA	AUUGUAUU	AAUACAAUC	CUAGAUGU
	719	UGGACAUC	CUGAUGA	X	GAA	AGGAUUGU	ACAAUCCUA	GAUGUCCA
	725	CGUAUUUG	CUGAUGA	X	GAA	ACAUCUAG	CUAGAUGUC	CAAUACG
	731	GGCGGGCG	CUGAUGA	X	GAA	AUUUGGAC	GUCCAAUA	CGCCCGCC
	758	UGCCCGUG	CUGAUGA	X	GAA	AGCAGUCU	AGACUGCUC	CACGGGCA
10	771	GAGGACAA	CUGAUGA	X	GAA	AGUCUGCC	GGCAGACUC	UUGUCCUC
	773	UUGAGGAC	CUGAUGA	X	GAA	AGAGUCUG	CAGACUCU	GUCCUCAA
	776	CAGUUGAG	CUGAUGA	X	GAA	ACAAGAGU	ACUCUUGUC	CUCAACUG
	779	GUGCAGUU	CUGAUGA	X	GAA	AGGACAAG	CUUGUCCUC	AACUGCAC
	803	CUCGUUUU	CUGAUGA	X	GAA	AGCUCCGU	ACGGAGCUC	AAUACGAG
15	807	CACCCUCG	CUGAUGA	X	GAA	AUUGAGCU	AGCUCAAUA	CGAGGGUG
	831	ACCAGGGU	CUGAUGA	X	GAA	AUUC CAGC	GCUGGAAUU	ACCCUGGU
	832	UACCAGGG	CUGAUGA	X	GAA	AAUUC CAG	CUGGAAUUA	CCCUGGUA
	840	AGUUGCUU	CUGAUGA	X	GAA	ACCAGGGU	ACCCUGGUA	AAGCAACU
	849	UGCUCUCU	CUGAUGA	X	GAA	AGUUGCUU	AAGCAACUA	AGAGAGCA
20	859	GCCUUUAU	CUGAUGA	X	GAA	AUGCUCUC	GAGAGCAUC	UAUAAGGC
	861	CUGCCUUA	CUGAUGA	X	GAA	AGAUGCUC	GAGCAUCUA	UAAGGCAG
	863	CGCUGCCU	CUGAUGA	X	GAA	AUAGAUGC	GCAUCUAUA	AGGCAGCG
	875	CUCCGGUC	CUGAUGA	X	GAA	AUCCGCUG	CAGCGGAUU	GACCGGAG
	888	GUUGUGGG	CUGAUGA	X	GAA	AUGGCUC	GGAGCCAUU	CCCACAAC
25	889	UGUUGUGG	CUGAUGA	X	GAA	AAUGGCUC	GAGCCAUUC	CCACAACA
	904	CACUGUGG	CUGAUGA	X	GAA	ACACAUUG	CAAUGUGUU	CCACAGUG
	905	ACACUGUG	CUGAUGA	X	GAA	AACACAUU	AAUGUGUUC	CACAGUGU
	914	AUCUUAAG	CUGAUGA	X	GAA	ACACUGUG	CACAGUGUU	CUUAAGAU
	915	GAUCUUA	CUGAUGA	X	GAA	AACACUGU	ACAGUGUUC	UUAAGAUC
30	917	UUGAUCUU	CUGAUGA	X	GAA	AGAACACU	AGUGUUCUU	AAGAUCAA
	918	GUUGAUCU	CUGAUGA	X	GAA	AAGAACAC	GUGUUCUUA	AGAUAAC
	923	ACAUUGUU	CUGAUGA	X	GAA	AUCUUAAG	CUUAAGAUC	AACAAUGU
	953	CAGGUGUA	CUGAUGA	X	GAA	AGCCCCUU	AAGGGGCUC	UACACCUG

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	955	GACAGGUG	CUGAUGA	X	GAA	AGAGCCCC	GGGGCUCUA	CACCUGUC
	963	CUUCACGC	CUGAUGA	X	GAA	ACAGGUGU	ACACCUGUC	GCGUGAAG
	979	GGAACGAG	CUGAUGA	X	GAA	ACCCACUC	GAGUGGGUC	CUCGUUCC
	982	ACUGGAAC	CUGAUGA	X	GAA	AGGACCCA	UGGGUCCUC	GUUCCAGU
5	985	AAGACUGG	CUGAUGA	X	GAA	ACGAGGAC	GUCCUCGUU	CCAGUCUU
	986	AAAGACUG	CUGAUGA	X	GAA	AACGAGGA	UCCUCGUUC	CAGUCUUU
	991	UGUUGAAA	CUGAUGA	X	GAA	ACUGGAAC	GUUCCAGUC	UUUCAACA
	993	GGUGUUGA	CUGAUGA	X	GAA	AGACUGGA	UCCAGUCUU	UCAACACC
	994	AGGUGUUG	CUGAUGA	X	GAA	AAGACUGG	CCAGUCUUU	CAACACCU
10	995	GAGGUGUU	CUGAUGA	X	GAA	AAAGACUG	CAGUCUUUC	AACACCUC
	1003	CAUGCACG	CUGAUGA	X	GAA	AGGUGUUG	CAACACCUC	CGUGCAUG
	1015	CUUUUUCA	CUGAUGA	X	GAA	ACACAUGC	GCAUGUGUA	UGAAAAAG
	1027	CACUGAUG	CUGAUGA	X	GAA	AUCCUUUU	AAAAGGAUU	CAUCAGUG
	1028	ACACUGAU	CUGAUGA	X	GAA	AAUCCUUU	AAAGGAUUC	AUCAGUGU
15	1031	UUCACACU	CUGAUGA	X	GAA	AUGAAUCC	GGAUUCAUC	AGUGUGAA
	1044	CUGCUUCC	CUGAUGA	X	GAA	AUGUUUCA	UGAAACAUC	GGAAGCAG
	1084	GCCGAUAG	CUGAUGA	X	GAA	ACCGUCUU	AAGACGGUC	CUAUCGGC
	1087	ACAGCCGA	CUGAUGA	X	GAA	AGGACCGU	ACGGUCCUA	UCGGCUGU
	1089	GGACAGCC	CUGAUGA	X	GAA	AUAGGACC	GGUCCUAUC	GGCUGUCC
20	1096	CUUUCAUG	CUGAUGA	X	GAA	ACAGCCGA	UCGGCUGUC	CAUGAAAG
	1114	GGGAGGGG	CUGAUGA	X	GAA	AGGCCUUC	GAAGGCCUU	CCCCUCCC
	1115	GGGAGGGG	CUGAUGA	X	GAA	AAGGCCUU	AAGGCCUUC	CCCUCCCC
	1120	UUUCUGGG	CUGAUGA	X	GAA	AGGGGAAG	CUUCCCCUC	CCCAGAAA
	1130	AACCAUAC	CUGAUGA	X	GAA	AUUUCUGG	CCAGAAAUC	GUAUGGUU
25	1133	UUUAACCA	CUGAUGA	X	GAA	ACGAUUUC	GAAAUUGUA	UGGUUAAA
	1138	CAUCUUUU	CUGAUGA	X	GAA	ACCAUACG	CGUAUGGUU	AAAAGAUG
	1139	CCAUCUUU	CUGAUGA	X	GAA	AACCAUAC	GUAUGGUUA	AAAGAUGG
	1150	UUGCAGGC	CUGAUGA	X	GAA	AGCCAUCU	AGAUGGCUC	GCCUGCAA
	1162	CAGACUUC	CUGAUGA	X	GAA	AUGUUGCA	UGCAACAUU	GAAGUCUG
30	1168	AGCGAGCA	CUGAUGA	X	GAA	ACUUCAAU	AUUGAAGUC	UGCUCGCU
	1173	CAAAUAGC	CUGAUGA	X	GAA	AGCAGACU	AGUCUGCUC	GCUAUUUG
	1177	GUACCAA	CUGAUGA	X	GAA	AGCGAGCA	UGCUCGCUA	UUUGGUAC
	1179	AUGUACCA	CUGAUGA	X	GAA	AUAGCGAG	CUCGCUAUU	UGGUACAU

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1180	CAUGUACC	CUGAUGA	X	GAA	AAUAGCGA	UCGCUAUUU	GGUACAUG
1184	UAGCCAUG	CUGAUGA	X	GAA	ACCAAAUA	UAUUUGGUA	CAUGGCCUA
1192	UUAAUGAG	CUGAUGA	X	GAA	AGCCAUGU	ACAUGGCCUA	CUCAUUAA
1195	UAAUUAU	CUGAUGA	X	GAA	AGUAGCCA	UGGCUACUC	AUUAAUUA
5 1198	UGAUAAU	CUGAUGA	X	GAA	AUGAGUAG	CUACUCAU	AAUUAUCA
1199	UUGAUAAU	CUGAUGA	X	GAA	AAUGAGUA	UACUCAUUA	AUUAUCA
1202	UCUUUGAU	CUGAUGA	X	GAA	AUUAAUGA	UCAUUAAU	AUCAAAGA
1203	AUCUUUGA	CUGAUGA	X	GAA	AAUUAUG	CAUUAUUUA	UCAAAGAU
1205	ACAUCUUU	CUGAUGA	X	GAA	AUAAUUA	UUAAUUUAUC	AAAGAUGU
10 1237	AGAUCGUA	CUGAUGA	X	GAA	AGUCCCCU	AGGGGACUA	UACGAUCU
1239	CAAGAUCC	CUGAUGA	X	GAA	AUAGUCCC	GGGACUUA	CGAUCUUG
1244	CCCAGCAA	CUGAUGA	X	GAA	AUCGUUA	UAUACGAUC	UUGCUGGG
1246	UGCCCAGC	CUGAUGA	X	GAA	AGAUCGUA	UACGAUCUU	GCUGGGCA
1256	GACUGCUU	CUGAUGA	X	GAA	AUGCCCAG	CUGGGCAUA	AAGCAGUC
15 1264	AUAGCCUU	CUGAUGA	X	GAA	ACUGCUUU	AAAGCAGUC	AAGGCUAU
1271	UUUUUAAA	CUGAUGA	X	GAA	AGCCUUGA	UCAAGGCUA	UUUAAAAA
1273	GGUUUUUA	CUGAUGA	X	GAA	AUAGCCUU	AAGGCUAUU	UAAAAACC
1274	AGGUUUUU	CUGAUGA	X	GAA	AAUAGCCU	AGGCUAUUU	AAAAACCU
1275	GAGGUUUU	CUGAUGA	X	GAA	AAUAGCC	GGCUAUUUU	AAAACCUC
20 1283	GUGGCAGU	CUGAUGA	X	GAA	AGGUUUUU	AAAAACCUC	ACUGCCAC
1293	UACAAUGA	CUGAUGA	X	GAA	AGUGGCAG	CUGCCACUC	UCAUUGUA
1295	UUUACAAU	CUGAUGA	X	GAA	AGAGUGGC	GCCACUCUC	AUUGUAAA
1298	ACGUUUAC	CUGAUGA	X	GAA	AUGAGAGU	ACUCUCAU	GUAAACGU
1301	UUCACGUU	CUGAUGA	X	GAA	ACAAUGAG	CUCAUUGUA	AACGUGAA
25 1314	GUAGAUCU	CUGAUGA	X	GAA	AGGUUUCA	UGAAACCUC	AGAUCUAC
1319	UUUUCGUA	CUGAUGA	X	GAA	AUCUGAGG	CCUCAGAU	UACGAAAA
1321	ACUUUUUC	CUGAUGA	X	GAA	AGAUCUGA	UCAGAUCUA	CGAAAAGU
1330	AGGACACG	CUGAUGA	X	GAA	ACUUUUUC	CGAAAAGUC	CGUGUCCU
1336	GAAGCGAG	CUGAUGA	X	GAA	ACACGGAC	GUCCGUGUC	CUCGCUUC
30 1339	UUGGAAGC	CUGAUGA	X	GAA	AGGACACG	CGUGUCCUC	GCUUCCAA
1343	GGGCUUGG	CUGAUGA	X	GAA	AGCGAGGA	UCCUCGCUU	CCAAGCCC
1344	UGGGCUUG	CUGAUGA	X	GAA	AAGCGAGG	CCUCGCUUC	CAAGCCCA
1356	CGGAUAGA	CUGAUGA	X	GAA	AGGUGGGC	GCCCACCUC	UCUAUCCG

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1358	AGCGGAUA	CUGAUGA	X	GAA	AGAGGUGG	CCACCUCUC	UAUCCGCU	
1360	CCAGCGGA	CUGAUGA	X	GAA	AGAGAGGU	ACCUCUCUA	UCCGCUGG	
1362	GCCCAGCG	CUGAUGA	X	GAA	AUAGAGAG	CUCUCUAUC	CGCUGGGC	
1382	CAAGUGAG	CUGAUGA	X	GAA	ACUUGUCU	AGACAAGUC	CUCACUUG	
5	1385	GUGCAAGU	CUGAUGA	X	GAA	AGGACUUG	CAAGUCCUC	ACUUGCAC
	1389	CACGGUGC	CUGAUGA	X	GAA	AGUGAGGA	UCCUCACUU	GCACCGUG
	1399	GGAUGCCA	CUGAUGA	X	GAA	ACACGGUG	CACCGUGUA	UGGCAUCC
	1406	GGCCGAGG	CUGAUGA	X	GAA	AUGCCAUA	UAUGGCAUC	CCUCGGCC
	1410	UGUUGGCC	CUGAUGA	X	GAA	AGGGAUGC	GCAUCCUC	GGCCAACA
10	1421	AGCCACGU	CUGAUGA	X	GAA	AUUGUUGG	CCAACAAUC	ACGUGGCU
	1430	GGGUGCCA	CUGAUGA	X	GAA	AGCCACGU	ACGUGGCUC	UGGCACCC
	1443	AUUGUGGU	CUGAUGA	X	GAA	ACAGGGGU	ACCCUGUC	ACCACAAU
	1452	UUUGGAGU	CUGAUGA	X	GAA	AUUGUGGU	ACCACAAUC	ACUCCAAA
	1456	UUUCUUUG	CUGAUGA	X	GAA	AGUGAUUG	CAAUCACUC	CAAAGAAA
15	1468	AGAAGUCA	CUGAUGA	X	GAA	ACCUUUCU	AGAAAGGUA	UGACUUCU
	1474	CAGUGCAG	CUGAUGA	X	GAA	AGUCAUAC	GUAUGACUU	CUGCACUG
	1475	UCAGUGCA	CUGAUGA	X	GAA	AAGUCAUA	UAUGACUUC	UGCACUGA
	1495	GGAUAAAG	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUC	CUUUAUCC
	1498	CCAGGAUA	CUGAUGA	X	GAA	AGGAUUCU	AGAAUCCUU	UAUCCUGG
20	1499	UCCAGGAU	CUGAUGA	X	GAA	AAGGAUUC	GAAUCCUUU	AUCCUGGA
	1500	AUCCAGGA	CUGAUGA	X	GAA	AAAGGAUU	AAUCCUUUA	UCCUGGAU
	1502	GGAUCCAG	CUGAUGA	X	GAA	AUAAAGGA	UCCUUUAUC	CUGGAUCC
	1509	GCUGCUGG	CUGAUGA	X	GAA	AUCCAGGA	UCCUGGAUC	CCAGCAGC
	1522	UGUUUCCU	CUGAUGA	X	GAA	AGUUGCUG	CAGCAACUU	AGGAAACA
25	1523	CUGUUUCC	CUGAUGA	X	GAA	AAGUUGCU	AGCAACUUA	GGAAACAG
	1535	AUGCUCUC	CUGAUGA	X	GAA	AUUCUGUU	AACAGAAUU	GAGAGCAU
	1544	CGCUGAGA	CUGAUGA	X	GAA	AUGCUCUC	GAGAGCAUC	UCUCAGCG
	1546	UGC GCUGA	CUGAUGA	X	GAA	AGAUGCUC	GAGCAUCUC	UCAGCGCA
	1548	CAUGC GCU	CUGAUGA	X	GAA	AGAGAUGC	GCAUCUCUC	AGCGCAUG
30	1562	CCUUCUAU	CUGAUGA	X	GAA	ACCGUCAU	AUGACGGUC	AUAGAAGG
	1565	GUUCCUUC	CUGAUGA	X	GAA	AUGACCGU	ACGGUCAUA	GAAGGAAC
	1578	AACCGUCU	CUGAUGA	X	GAA	AUUGUUC	GAACAAUA	AGACGGUU
	1586	AAUGUGCU	CUGAUGA	X	GAA	ACCGUCUU	AAGACGGUU	AGCACAUI

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1587	CAAUGUGC	CUGAUGA	X	GAA	AACCGUCU	AGACGGUUA	GCACAUUG	
1594	CCACCACC	CUGAUGA	X	GAA	AUGUGCUA	UAGCACAUU	GGUGGUGG	
1609	GGGUCUGA	CUGAUGA	X	GAA	AGUCAGCC	GGCUGACUC	UCAGACCC	
1611	AGGGGUCU	CUGAUGA	X	GAA	AGAGUCAG	CUGACUCUC	AGACCCCU	
5	1625	CAGCUGUA	CUGAUGA	X	GAA	AUUC CAGG	CCUGGAAUC	UACAGCUG
1627	GGCAGCUG	CUGAUGA	X	GAA	AGAUUCCA	UGGAAUCUA	CAGCUGCC	
1642	UUUUAUUG	CUGAUGA	X	GAA	AGGCCCGG	CCGGGCCUU	CAAUAAAA	
1643	AUUUUAUU	CUGAUGA	X	GAA	AAGGCCCG	CGGGCCUUC	AAUAAAAU	
1647	CCCUAUUU	CUGAUGA	X	GAA	AUUGAAGG	CCUUCAAUA	AAAUAGGG	
10	1652	ACAGUCCC	CUGAUGA	X	GAA	AUUUUAUU	AAUAAAAUA	GGGACUGU
1673	UAAAAUUU	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUU	AAAUUUUA	
1678	UGACAUAA	CUGAUGA	X	GAA	AUUUUAUG	CAUAAAAUU	UUAUGUCA	
1679	GUGACAUU	CUGAUGA	X	GAA	AAUUUUUU	AUAAAAUUU	UAUGUCAC	
1680	UGUGACAU	CUGAUGA	X	GAA	AAAUUUUA	UAAAAUUUU	AUGUCACA	
15	1681	CUGUGACA	CUGAUGA	X	GAA	AAAAUUUU	AAAAUUUUA	UGUCACAG
1685	ACAUCUGU	CUGAUGA	X	GAA	ACAUAAAA	UUUUAUGUC	ACAGAUGU	
1705	AAACGUGA	CUGAUGA	X	GAA	AGCCAUUC	GAAUGGCUU	UCACGUUU	
1706	GAAACGUG	CUGAUGA	X	GAA	AAGCCAUU	AAUGGCUUU	CACGUUUC	
1707	GGAAACGU	CUGAUGA	X	GAA	AAAGCCAU	AUGGCUUUC	ACGUUUCC	
20	1712	UCCAAGGA	CUGAUGA	X	GAA	ACGUGAAA	UUUCACGUU	UCCUUGGA
1713	UUCCAAGG	CUGAUGA	X	GAA	AACGUGAA	UUCACGUUU	CCUUGGAA	
1714	UUUCCAAG	CUGAUGA	X	GAA	AAACGUGA	UCACGUUUC	CUUGGAAA	
1717	UCUUUUCC	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUU	GGAAAAGA	
1756	CCACACAG	CUGAUGA	X	GAA	ACAGUUUC	GAAACUGUC	CUGUGUGG	
25	1766	AAUUUAUU	CUGAUGA	X	GAA	ACCACACA	UGUGUGGUC	AAUAAAUU
1770	CAGGAAUU	CUGAUGA	X	GAA	AUUGACCA	UGGUCAAUA	AAUUC CUG	
1774	UGUACAGG	CUGAUGA	X	GAA	AUUUAUUG	CAAUAAAUU	CCUGUACA	
1775	CUGUACAG	CUGAUGA	X	GAA	AAUUUAUU	AAUAAAUUC	CUGUACAG	
1780	UGUCUCUG	CUGAUGA	X	GAA	ACAGGAAU	AUUC CUGUA	CAGAGACA	
30	1790	AUCCAGGU	CUGAUGA	X	GAA	AUGUCUCU	AGAGACAUU	ACCUGGAU
1791	AAUCCAGG	CUGAUGA	X	GAA	AAUGUCUC	GAGACAUUA	CCUGGAUU	
1799	CGUAGCAG	CUGAUGA	X	GAA	AUCCAGGU	ACCUGGAUU	CUGCUACG	
1800	CCGUAGCA	CUGAUGA	X	GAA	AAUCCAGG	CCUGGAUUC	UGCUACGG	



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1805	ACUGUCCG CUGAUGA X GAA AGCAGAAU	AUUCUGCUA CGGACAGU
1814	CUGUUGUU CUGAUGA X GAA ACUGUCCG	CGGACAGUU AACAACAG
1815	UCUGUUGU CUGAUGA X GAA AACUGUCC	GGACAGUUA ACAACAGA
1836	GCUGAUAC CUGAUGA X GAA AUGGUGCA	UGCACCAUA GUAUCAGC
5 1839	CUUGCUGA CUGAUGA X GAA ACUAUGGU	ACCAUAGUA UCAGCAAG
1841	UGCUGUCU CUGAUGA X GAA AUACUAUG	CAUAGUAUC AGCAAGCA
1866	GUAAUCUU CUGAUGA X GAA AGUGGUGG	CCACCACUC AAGAUUAC
1872	GAUGGAGU CUGAUGA X GAA AUCUUGAG	CUCAAGAUU ACUCCAUC
1873	UGAUGGAG CUGAUGA X GAA AAUCUUGA	UCAAGAUUA CUCCAUCA
10 1876	GAGUGAUG CUGAUGA X GAA AGUAAUCU	AGAUUACUC CAUCACUC
1880	UUCAGAGU CUGAUGA X GAA AUGGAGUA	UACUCCAUC ACUCUGAA
1884	AAGGUUCA CUGAUGA X GAA AGUGAUGG	CCAUCACUC UGAACCUU
1892	UUGAUGAC CUGAUGA X GAA AGGUUCAG	CUGAACCUU GUCAUCAA
1895	UUCUUGAU CUGAUGA X GAA ACAAGGUU	AACCUUGUC AUCAAGAA
15 1898	ACGUUCUU CUGAUGA X GAA AUGACAAG	CUUGUCAUC AAGAACGU
1909	CUUCUAGA CUGAUGA X GAA ACACGUUC	GAACGUGUC UCUAGAAG
1911	GUCUUCUA CUGAUGA X GAA AGACACGU	ACGUGUCUC UAGAAGAC
1913	GAGUCUUC CUGAUGA X GAA AGAGACAC	GUGUCUCUA GAAGACUC
1921	AGGUGCCC CUGAUGA X GAA AGUCUUCU	AGAAGACUC GGGCACCU
20 1930	UGCACGCA CUGAUGA X GAA AGGUGCCC	GGGCACCUA UGCGUGCA
1952	CCUGUGUA CUGAUGA X GAA AUGUCCU	AGGAACAUU UACACAGG
1954	CCCCUGUG CUGAUGA X GAA AUAUGUUC	GAACAUUAU CACAGGGG
1970	UUCCGAAG CUGAUGA X GAA AUGUCUUC	GAAGACAUC CUUCGGAA
1973	GUCUCCG CUGAUGA X GAA AGGAUGUC	GACAUCCUU CGGAAGAC
25 1974	UGUCUCC CUGAUGA X GAA AAGGAUGU	ACAUCCUUC GGAAGACA
1988	CUAACGAG CUGAUGA X GAA ACUUCUGU	ACAGAAGUU CUCGUUAG
1989	UCUAACGA CUGAUGA X GAA AACUUCUG	CAGAAGUUC UCGUUGA
1991	UCUCUAAC CUGAUGA X GAA AGAACUUC	GAAGUUCUC GUUAGAGA
1994	GAAUCUCU CUGAUGA X GAA ACGAGAAC	GUUCUCGUU AGAGAUUC
30 1995	CGAAUCUC CUGAUGA X GAA AACGAGAA	UUCUCGUUA GAGAUUCG
2001	CGCUUCCG CUGAUGA X GAA AUCUCUAA	UUAGAGAUU CGGAAGCG
2002	GCGCUUCC CUGAUGA X GAA AAUCUCUA	UAGAGAUUC GGAAGCGC
2021	AGGUUUUG CUGAUGA X GAA AGCAGGUG	CACCUGCUU CAAAACCU

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	2022	GAGGUUUU	CUGAUGA	X	GAA	AAGCAGGU	ACCUGCUUC	AAAACCUC
	2030	UAGUCACU	CUGAUGA	X	GAA	AGGUUUUG	CAAAACCUC	AGUGACUA
	2038	AGACCUCG	CUGAUGA	X	GAA	AGUCACUG	CAGUGACUA	CGAGGUCU
	2045	CUGAUGGA	CUGAUGA	X	GAA	ACCUCGUA	UACGAGGUC	UCCAUCAG
5	2047	CACUGAUG	CUGAUGA	X	GAA	AGACCUCG	CGAGGUCUC	CAUCAGUG
	2051	GAGCCACU	CUGAUGA	X	GAA	AUGGAGAC	GUCUCCAUC	AGUGGCUC
	2059	AGGUCGUA	CUGAUGA	X	GAA	AGCCACUG	CAGUGGCUC	UACGACCU
	2061	UAAGGUCG	CUGAUGA	X	GAA	AGAGCCAC	GUGGCUCUA	CGACCUUA
	2068	GACAGUCU	CUGAUGA	X	GAA	AGGUCGUA	UACGACCUU	AGACUGUC
10	2069	UGACAGUC	CUGAUGA	X	GAA	AAGGUCGU	ACGACCUUA	GACUGUCA
	2076	UCUAGCUU	CUGAUGA	X	GAA	ACAGUCUA	UAGACUGUC	AAGCUAGA
	2082	GACACCUC	CUGAUGA	X	GAA	AGCUUGAC	GUCAAGCUA	GAGGUGUC
	2090	GGCGCGGG	CUGAUGA	X	GAA	ACACCUCU	AGAGGUGUC	CCGCGGCC
	2100	AGUGAUCU	CUGAUGA	X	GAA	AGGCGCGG	CCGCGCCUC	AGAUCACU
15	2105	AACCAAGU	CUGAUGA	X	GAA	AUCUGAGG	CCUCAGAUC	ACUUGGUU
	2109	UUUGAACC	CUGAUGA	X	GAA	AGUGAUCU	AGAUCACUU	GGUUCAAA
	2113	UGUUUUUG	CUGAUGA	X	GAA	ACCAAGUG	CACUUGGUU	CAAAAACA
	2114	UUGUUUUU	CUGAUGA	X	GAA	AACCAAGU	ACUUGGUUC	AAAAACAA
	2132	UCUUGUUG	CUGAUGA	X	GAA	AUUUUGUG	CACAAAUA	CAACAAGA
20	2150	CCUAAAAU	CUGAUGA	X	GAA	AUUCCTCG	CCGGGAUUU	AUUUUAGG
	2151	UCCUAAAA	CUGAUGA	X	GAA	AAUUCCTCG	CGGGAAUUA	UUUUAGGA
	2153	GGUCCUAA	CUGAUGA	X	GAA	AUAAUUCC	GGAAUUAUU	UUAGGACC
	2154	UGGUCCUA	CUGAUGA	X	GAA	AAUAAUUC	GAAUUAUUU	UAGGACCA
	2155	CUGGUCCU	CUGAUGA	X	GAA	AAUAAUUC	AAUUAUUUU	AGGACCAG
25	2156	CCUGGUCC	CUGAUGA	X	GAA	AAAUAUAA	AUUAUUUUA	GGACCAGG
	2179	UUUCAUAU	CUGAUGA	X	GAA	ACAGCGUG	CACGCUGUU	UAUUGAAA
	2180	CUUUCAAU	CUGAUGA	X	GAA	AACAGCGU	ACGCUGUUU	AUUGAAAG
	2181	UCUUUCAA	CUGAUGA	X	GAA	AAACAGCG	CGCUGUUUA	UUGAAAGA
	2183	ACUCUUUC	CUGAUGA	X	GAA	AUAAACAG	CUGUUUAUU	GAAAGAGU
30	2192	UCCUCUGU	CUGAUGA	X	GAA	ACUCUUUC	GAAAGAGUC	ACAGAGGA
	2213	CACCUAUA	CUGAUGA	X	GAA	ACACCCUC	GAGGGUGUC	UAUAGGUG
	2215	GGCACCUA	CUGAUGA	X	GAA	AGACACCC	GGGUGUCUA	UAGGUGCC
	2217	UCGGCACC	CUGAUGA	X	GAA	AUAGACAC	GUGUCUAUA	GGUGCCGA

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	2263	CGGUGAGG	CUGAUGA	X	GAA	AGGCUGCG	CGCAGCCUA	CCUCACCG
	2267	UGCACGGU	CUGAUGA	X	GAA	AGGUAGGC	GCCUACCUC	ACCGUGCA
	2284	ACUUGUCU	CUGAUGA	X	GAA	AGGUUCCU	AGGAACCUC	AGACAAGU
	2293	CCAGGUUU	CUGAUGA	X	GAA	ACUUGUCU	AGACAAGUC	AAACCUGG
5	2309	GUGAGCGU	CUGAUGA	X	GAA	AUCAGCUC	GAGCUGAUC	ACGCUCAC
	2315	GUGCACGU	CUGAUGA	X	GAA	AGCGUGAU	AUCACGCUC	ACGUGCAC
	2342	AGCCAAAA	CUGAUGA	X	GAA	AGGGUCGC	GCGACCCUC	UUUUGGCU
	2344	GGAGCCAA	CUGAUGA	X	GAA	AGAGGGUC	GACCCUCUU	UUGGCUCC
	2345	AGGAGCCA	CUGAUGA	X	GAA	AAGAGGGU	ACCCUCUUU	UGGCUCCU
10	2346	AAGGAGCC	CUGAUGA	X	GAA	AAAGAGGG	CCCUCUUUU	GGCUCCUU
	2351	GUUAGAAG	CUGAUGA	X	GAA	AGCCAAAA	UUUUGGCUC	CUUCUAAC
	2354	AGAGUUAG	CUGAUGA	X	GAA	AGGAGCCA	UGGCUCCUU	CUAACUCU
	2355	GAGAGUUA	CUGAUGA	X	GAA	AAGGAGCC	GGCUCCUUC	UAACUCUC
	2357	AAGAGAGU	CUGAUGA	X	GAA	AGAAGGAG	CUCUUCUA	ACUCUCUU
15	2361	GAUGAAGA	CUGAUGA	X	GAA	AGUUAGAA	UUCUAACUC	UCUUCAUC
	2363	CUGAUGAA	CUGAUGA	X	GAA	AGAGUUAG	CUAACUCUC	UUCAUCAG
	2365	UUCUGAUG	CUGAUGA	X	GAA	AGAGAGUU	AACUCUCUU	CAUCAGAA
	2366	UUUCUGAU	CUGAUGA	X	GAA	AAGAGAGU	ACUCUCUUC	AUCAGAAA
	2369	AGUUUUCU	CUGAUGA	X	GAA	AUGAAGAG	CUCUUCAUC	AGAAAACU
20	2386	CGGAAGAA	CUGAUGA	X	GAA	ACCGCUUC	GAAGCGGUC	UUCUUCGG
	2388	UUCGGAAG	CUGAUGA	X	GAA	AGACCGCU	AGCGGUCUU	CUUCCGAA
	2389	CUUCGGA	CUGAUGA	X	GAA	AAGACCGC	GCGGUCUUC	UUCGGAAG
	2391	UACUUCGG	CUGAUGA	X	GAA	AGAAGACC	GGUCUUCUU	CCGAAGUA
	2392	UUACUUCG	CUGAUGA	X	GAA	AAGAAGAC	GUCUUCUUC	CGAAGUAA
25	2399	UCUGUCUU	CUGAUGA	X	GAA	ACUUCGGA	UCCGAAGUA	AAGACAGA
	2410	UUGACAGG	CUGAUGA	X	GAA	AGUCUGUC	GACAGACUA	CCUGUCAA
	2416	UAAUGAUU	CUGAUGA	X	GAA	ACAGGUAG	CUACCUGUC	AAUCAUUA
	2420	UCCAUAUU	CUGAUGA	X	GAA	AUUGACAG	CUGUCAAUC	AUUAUGGA
	2423	GGGUCCA	CUGAUGA	X	GAA	AUGAUUGA	UCAAUCAUU	AUGGACCC
30	2424	UGGGUCCA	CUGAUGA	X	GAA	AAUGAUUG	CAAUCAUUA	UGGACCCA
	2441	UCCAGGGG	CUGAUGA	X	GAA	ACUUCAUC	GAUGAAGUU	CCCCUGGA
	2442	AUCCAGGG	CUGAUGA	X	GAA	AACUUCAU	AUGAAGUUC	CCCUGGAU
	2473	UGGCAUCA	CUGAUGA	X	GAA	AGGGCAGC	GCUGCCCUA	UGAUGCCA

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2494	CCCGUGCA	CUGAUGA	X	GAA	ACUCCAC	GUGGGAGUU	UGCACGGG
2495	UCCCGUGC	CUGAUGA	X	GAA	AACUCCCA	UGGGAGUUU	GCACGGGA
2516	GAUUUGCC	CUGAUGA	X	GAA	AGUUUCAG	CUGAAACUA	GGCAAUUC
2524	UUCCGAGC	CUGAUGA	X	GAA	AUUUGCCU	AGGCAAUUC	GCUCGGAA
5 2528	CCUCUUC	CUGAUGA	X	GAA	AGCGAUUU	AAAUCGCUC	GGAAGAGG
2541	UUUCCCAA	CUGAUGA	X	GAA	AGCCCCUC	GAGGGGCUU	UUGGGAAA
2542	CUUUCCCA	CUGAUGA	X	GAA	AAGCCCCU	AGGGGCUUU	UGGGAAAG
2543	ACUUUCCC	CUGAUGA	X	GAA	AAAGCCCC	GGGGCUUUU	GGGAAAGU
2552	GCUUGAAC	CUGAUGA	X	GAA	ACUUUCCC	GGGAAAGUC	GUUCAAGC
10 2555	GAGGCUUG	CUGAUGA	X	GAA	ACGACUUU	AAAGUCGUU	CAAGCCUC
2556	AGAGGCUU	CUGAUGA	X	GAA	AACGACUU	AAGUCGUUC	AAGCCUCU
2563	CAA AUGCA	CUGAUGA	X	GAA	AGGCUUGA	UCAAGCCUC	UGCAUUUG
2569	UAAUGCCA	CUGAUGA	X	GAA	AUGCAGAG	CUCUGCAUU	UGGCAUUA
2570	UUA AUGCC	CUGAUGA	X	GAA	AAUGCAGA	UCUGCAUUU	GGCAUUA
15 2576	GAUUUCUU	CUGAUGA	X	GAA	AUGCCAAA	UUUGGCAUU	AAGAAAUC
2577	UGAUUUCU	CUGAUGA	X	GAA	AAUGCCAA	UUUGGCAUUA	AGAAAUCA
2584	AGGUGGGU	CUGAUGA	X	GAA	AUUUCUUA	UAAGAAAUC	ACCCACCU
2617	CCUCUUUC	CUGAUGA	X	GAA	ACAUCUUC	GAAGAUGUU	GAAAGAGG
2644	GAGCUUUG	CUGAUGA	X	GAA	ACUCACUG	CAGUGAGUA	CAAAGCUC
20 2652	GGUCAUCA	CUGAUGA	X	GAA	AGCUUUGU	ACAAAGCUC	UGAUGACC
2666	AAGAUCUU	CUGAUGA	X	GAA	AGUUCGGU	ACCGAACUC	AAGAUCUU
2672	UGGGUCAA	CUGAUGA	X	GAA	AUCUUGAG	CUCAAGAU	UUGACCCA
2674	UGUGGGUC	CUGAUGA	X	GAA	AGAUCUUG	CAAGAUCUU	GACCCACA
2684	UGAUGGCC	CUGAUGA	X	GAA	AUGUGGGU	ACCCACAUC	GGCCAUCA
25 2691	AUUCAGAU	CUGAUGA	X	GAA	AUGGCCGA	UCGGCCAUC	AUCUGAAU
2694	CACAUUCA	CUGAUGA	X	GAA	AUGAUGGC	GCCAUCAUC	UGAAUGUG
2705	AGGAGGUU	CUGAUGA	X	GAA	ACCACAUU	AAUGUGGUU	AACCUCCU
2706	CAGGAGGU	CUGAUGA	X	GAA	AACCACAU	AUGUGGUUA	ACCUCCUG
2711	GCUCCAC	CUGAUGA	X	GAA	AGGUUAAC	GUUAACCUC	CUGGGAGC
30 2742	CACCAUCA	CUGAUGA	X	GAA	AGGCCUC	GAGGGCCUC	UGAUGGUG
2753	UAUCCAC	CUGAUGA	X	GAA	AUCACCAU	AUGGUGAUC	GUGGAAUA
2761	AUUUGCAG	CUGAUGA	X	GAA	AUCCACG	CGUGGAAUA	CUGCAAU
2770	GGUUUCCG	CUGAUGA	X	GAA	AUUUGCAG	CUGCAAUA	CGGAAACC

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	2782	GGUAGUUG	CUGAUGA	X	GAA	ACAGGUUU	AAACCUGUC	CAACUACC
	2788	UCUUGAGG	CUGAUGA	X	GAA	AGUUGGAC	GUCCAACUA	CCUCAAGA
	2792	UUGCUCUU	CUGAUGA	X	GAA	AGGUAGUU	AACUACCUC	AAGAGCAA
	2809	GACAGAAU	CUGAUGA	X	GAA	AGUCACGU	ACGUGACUU	AUUCUGUC
5	2810	AGACAGAA	CUGAUGA	X	GAA	AAGUCACG	CGUGACUUA	UUCUGUCU
	2812	UGAGACAG	CUGAUGA	X	GAA	AUAAGUCA	UGACUUAUU	CUGUCUCA
	2813	UUGAGACA	CUGAUGA	X	GAA	AAUAAGUC	GACUUAUUC	UGUCUCA
	2817	CUUGUUGA	CUGAUGA	X	GAA	ACAGAAUA	UAUUCUGUC	UCAACAAG
	2819	UCCUUGUU	CUGAUGA	X	GAA	AGACAGAA	UUCUGUCUC	AACAAGGA
10	2836	CCAU AUGC	CUGAUGA	X	GAA	AGGCUGCG	CGCAGCCUU	GCAUAUGG
	2841	GAGCUCCA	CUGAUGA	X	GAA	AUGCAAGG	CCUUGCAUA	UGGAGCUC
	2849	UCUUUCUU	CUGAUGA	X	GAA	AGCUCCAU	AUGGAGCUC	AAGAAAGA
	2900	ACACUGUC	CUGAUGA	X	GAA	AGGCGGGG	CCCCGCCUA	GACAGUGU
	2909	GAGCUGCU	CUGAUGA	X	GAA	ACACUGUC	GACAGUGUC	AGCAGCUC
15	2917	UGACACUU	CUGAUGA	X	GAA	AGCUGCUG	CAGCAGCUC	AAGUGUCA
	2924	GAGCUGGU	CUGAUGA	X	GAA	ACACUUGA	UCAAGUGUC	ACCAGCUC
	2932	GGAAGCUG	CUGAUGA	X	GAA	AGCUGGUG	CACCAGCUC	CAGCUUCC
	2938	CUUCAGGG	CUGAUGA	X	GAA	AGCUGGAG	CUCCAGCUU	CCCUGAAG
	2939	UCUUCAGG	CUGAUGA	X	GAA	AAGCUGGA	UCCAGCUUC	CCUGAAGA
20	2982	CUCACUGU	CUGAUGA	X	GAA	AUCCUCGU	ACGAGGAUU	ACAGUGAG
	2983	UCUCACUG	CUGAUGA	X	GAA	AAUCCUCG	CGAGGAUUA	CAGUGAGA
	2993	UGCUGGA	CUGAUGA	X	GAA	AUCUCACU	AGUGAGAUC	UCCAAGCA
	2995	GCUGCUUG	CUGAUGA	X	GAA	AGAUCUCA	UGAGAUCUC	CAAGCAGC
	3008	UCCAUGGU	CUGAUGA	X	GAA	AGGGGCUG	CAGCCCCUC	ACCAUGGA
25	3026	CUGUAGGA	CUGAUGA	X	GAA	AUCAGGUC	GACCUGAUU	UCCUACAG
	3027	ACUGUAGG	CUGAUGA	X	GAA	AAUCAGGU	ACCUGAUUU	CCUACAGU
	3028	AACUGUAG	CUGAUGA	X	GAA	AAAUCAGG	CCUGAUUUC	CUACAGUU
	3031	GGAAACUG	CUGAUGA	X	GAA	AGGAAAUC	GAUUUCCUA	CAGUUUCC
	3036	CACUUGGA	CUGAUGA	X	GAA	ACUGUAGG	CCUACAGUU	UCCAAGUG
30	3037	CCACUUGG	CUGAUGA	X	GAA	AACUGUAG	CUACAGUUU	CCAAGUGG
	3038	GCCACUUG	CUGAUGA	X	GAA	AAACUGUA	UACAGUUUC	CAAGUGGC
	3061	AGGACAGA	CUGAUGA	X	GAA	ACUCCAUG	CAUGGAGUU	UCUGUCCU
	3062	GAGGACAG	CUGAUGA	X	GAA	AACUCCAU	AUGGAGUUU	CUGUCCUC

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	3063	GGAGGACA	CUGAUGA	X	GAA	AAACUCCA	UGGAGUUUC	UGUCCUCC
	3067	UUCUGGAG	CUGAUGA	X	GAA	ACAGAAAC	GUUUCUGUC	CUCCAGAA
	3070	ACUUUCUG	CUGAUGA	X	GAA	AGGACAGA	UCUGUCCUC	CAGAAAGU
	3083	UCCCGAUG	CUGAUGA	X	GAA	AUGCACUU	AAGUGCAUU	CAUCGGGA
5	3084	GUCCCGAU	CUGAUGA	X	GAA	AAUGCACU	AGUGCAUUC	AUCGGGAC
	3087	CAGGUCCC	CUGAUGA	X	GAA	AUGAAUGC	GCAUUCAUC	GGGACCUG
	3110	GAUAAAAG	CUGAUGA	X	GAA	AUGUUUCU	AGAAACAUC	CUUUUAUC
	3113	UCAGAUAA	CUGAUGA	X	GAA	AGGAUGUU	AACAUCUUU	UUAUCUGA
	3114	CUCAGAU	CUGAUGA	X	GAA	AAGGAUGU	ACAUCUUUU	UAUCUGAG
10	3115	UCUCAGAU	CUGAUGA	X	GAA	AAAGGAUG	CAUCCUUUU	AUCUGAGA
	3116	UUCUCAGA	CUGAUGA	X	GAA	AAAAGGAU	AUCCUUUUA	UCUGAGAA
	3118	UGUUCUCA	CUGAUGA	X	GAA	AUAAAAGG	CCUUUUUUC	UGAGAACA
	3140	AAGUCGCA	CUGAUGA	X	GAA	AUCUUCAC	GUGAAGAUU	UGCGACUU
	3141	AAAGUCGC	CUGAUGA	X	GAA	AAUCUUCA	UGAAGAUUU	GCGACUUU
15	3148	CCAGGCCA	CUGAUGA	X	GAA	AGUCGCAA	UUGCGACUU	UGGCCUGG
	3149	GCCAGGCC	CUGAUGA	X	GAA	AAGUCGCA	UGCGACUUU	GGCCUGGC
	3165	CUUAUAAA	CUGAUGA	X	GAA	AUCCCGGG	CCCGGGUAU	UUUAUAAG
	3167	UUCUUUAU	CUGAUGA	X	GAA	AUAUCCCG	CGGGAUUAU	UAUAAGAA
	3168	GUUCUUUAU	CUGAUGA	X	GAA	AAUAUCCC	GGGAUUAUU	AUAAGAAC
20	3169	GGUUCUUA	CUGAUGA	X	GAA	AAUAUCC	GGAUUAUUU	UAAGAACC
	3171	AGGGUUCU	CUGAUGA	X	GAA	AUAAUAU	AUAUUUAUA	AGAACCCU
	3183	CCUCACAU	CUGAUGA	X	GAA	AUCAGGGU	ACCCUGAUU	AUGUGAGG
	3184	UCCUCACA	CUGAUGA	X	GAA	AAUCAGGG	CCCUGAUUA	UGUGAGGA
	3201	AAGUCGAG	CUGAUGA	X	GAA	AUCUCCUC	GAGGAGUAU	CUCGACUU
25	3204	GGGAAGUC	CUGAUGA	X	GAA	AGUAUCUC	GAGAUACUC	GACUCCCC
	3209	UUUAGGGG	CUGAUGA	X	GAA	AGUCGAGU	ACUCGACUU	CCCCUAAA
	3210	UUUUAGGG	CUGAUGA	X	GAA	AAGUCGAG	CUCGACUUC	CCCUAAAA
	3215	AUCCAUUU	CUGAUGA	X	GAA	AGGGGAAG	CUUCCCCUA	AAAUGGAU
	3228	GGAUUCAG	CUGAUGA	X	GAA	AGCCAUCC	GGAUGGCUC	CUGAAUCC
30	3235	CAAAGAUG	CUGAUGA	X	GAA	AUUCAGGA	UCCUGAAUC	CAUCUUUG
	3239	UUGUCAAA	CUGAUGA	X	GAA	AUGGAUUC	GAAUCCAUC	UUUGACAA
	3241	CCUUGUCA	CUGAUGA	X	GAA	AGAUGGAU	AUCCAUCUU	UGACAAGG
	3242	ACCUUGUC	CUGAUGA	X	GAA	AAGAUGGA	UCCAUCUUU	GACAAGGU

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	3251	GUGCUGUA	CUGAUGA	X	GAA	ACCUUGUC	GACAAGGUC	UACAGCAC
	3253	UGGUGCUG	CUGAUGA	X	GAA	AGACCUUG	CAAGGUCUA	CAGCACCA
	3277	CGCCAUAG	CUGAUGA	X	GAA	ACCACACA	UGUGUGGUC	CUAUGGCG
	3280	ACACGCCA	CUGAUGA	X	GAA	AGGACCAC	GUGGUCCUA	UGGCGUGU
5	3289	CCCACAGC	CUGAUGA	X	GAA	ACACGCCA	UGGCGUGUU	GCUGUGGG
	3302	AAGGAGAA	CUGAUGA	X	GAA	AUCUCCCA	UGGGAGAUU	UUCUCCUU
	3304	CUAAGGAG	CUGAUGA	X	GAA	AGAUCUCC	GGAGAUUUU	CUCCUAG
	3305	CCUAAGGA	CUGAUGA	X	GAA	AAGAUCUC	GAGAUUUU	UCCUAGG
	3307	CCCCUAAG	CUGAUGA	X	GAA	AGAAGAUU	GAUCUUUCU	CUUAGGGG
10	3310	AACCCCCU	CUGAUGA	X	GAA	AGGAGAAG	CUUCUCCUU	AGGGGGUU
	3311	GAACCCCC	CUGAUGA	X	GAA	AAGGAGAA	UUCUCCUUA	GGGGGUUC
	3318	GUAUGGAG	CUGAUGA	X	GAA	ACCCCCUA	UAGGGGGUU	CUCCAUAC
	3319	GGUAUGGA	CUGAUGA	X	GAA	AACCCCCU	AGGGGGUUC	UCCAUACC
	3321	UGGGUAUG	CUGAUGA	X	GAA	AGAACCCC	GGGGUUCUC	CAUACCCA
15	3325	CUCCUGGG	CUGAUGA	X	GAA	AUGGAGAA	UUCUCCAUA	CCCAGGAG
	3352	GGCUGCAG	CUGAUGA	X	GAA	AGUCUUCA	UGAAGACUU	CUGCAGCC
	3353	CGGCUGCA	CUGAUGA	X	GAA	AAGUCUUC	GAAGACUUC	UGCAGCCG
	3397	GUGUGGCA	CUGAUGA	X	GAA	ACUCCGGG	CCCGGAGUA	UGCCACAC
	3413	AUUUGGUA	CUGAUGA	X	GAA	AUUUCAGG	CCUGAAAUC	UACCAAUU
20	3415	UGAUUUGG	CUGAUGA	X	GAA	AGAUUUCA	UGAAAUCUA	CCAAAUCA
	3422	UCCAACAU	CUGAUGA	X	GAA	AUUUGGUA	UACCAAUUC	AUGUUGGA
	3427	AGCAAUCC	CUGAUGA	X	GAA	ACAUGAUU	AAUCAUGUU	GGAUUGCU
	3432	GUGCCAGC	CUGAUGA	X	GAA	AUCCAACA	UGUUGGAUU	GCUGGCAC
	3466	GUUCAGCA	CUGAUGA	X	GAA	ACCGGGGC	GCCCCGGUU	UGCUGAAC
25	3467	AGUUCAGC	CUGAUGA	X	GAA	AACCGGGG	CCCCGGUUU	GCUGAACU
	3476	UUCUCCAC	CUGAUGA	X	GAA	AGUUCAGC	GCUGAACUU	GUGGAGAA
	3488	AGGUCACC	CUGAUGA	X	GAA	AGUUUCUC	GAGAAACUU	GGUGACCU
	3500	UUGGCUUG	CUGAUGA	X	GAA	AGCAGGUC	GACCUGCUU	CAAGCCAA
	3501	GUUGGCUU	CUGAUGA	X	GAA	AAGCAGGU	ACCUGCUUC	AAGCCAAC
30	3512	UCCUGUUG	CUGAUGA	X	GAA	ACGUUGGC	GCCAACGUC	CAACAGGA
	3531	GGGGAUGU	CUGAUGA	X	GAA	AUCUUUCC	GGAAAGAUU	ACAUCCCC
	3532	GGGGGAUG	CUGAUGA	X	GAA	AAUCUUUC	GAAAGAUUA	CAUCCCCC
	3536	UUGAGGGG	CUGAUGA	X	GAA	AUGUAAUC	GAUUACAUC	CCCCUCAA

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	3542	AUGGCAUU	CUGAUGA	X	GAA	AGGGGGAU	AUCCCCCUC	AAUGCCAU
	3551	CUAGUCAG	CUGAUGA	X	GAA	AUGGCAUU	AAUGCCAU	CUGACUAG
	3558	ACUGUUUC	CUGAUGA	X	GAA	AGUCAGUA	UACUGACUA	GAAACAGU
	3567	UGUGAAGC	CUGAUGA	X	GAA	ACUGUUUC	GAAACAGUA	GCUUCACA
5	3571	AGUAUGUG	CUGAUGA	X	GAA	AGCUACUG	CAGUAGCUU	CACAUACU
	3572	GAGUAUGU	CUGAUGA	X	GAA	AAGCUACU	AGUAGCUUC	ACAUACUC
	3577	GGGUCGAG	CUGAUGA	X	GAA	AUGUGAAG	CUUCACAU	CUCGACCC
	3580	UGGGGGUC	CUGAUGA	X	GAA	AGUAUGUG	CACAUACUC	GACCCCCA
	3592	CCUCAGAG	CUGAUGA	X	GAA	AGGUGGGG	CCCCACCUU	CUCUGAGG
10	3593	UCCUCAGA	CUGAUGA	X	GAA	AAGGUGGG	CCCACCUUC	UCUGAGGA
	3595	GGUCCUCA	CUGAUGA	X	GAA	AGAAGGUG	CACCUUCUC	UGAGGACC
	3605	UCCUUGAA	CUGAUGA	X	GAA	AGGUCCUC	GAGGACCUU	UUCAAGGA
	3606	GUCCUUGA	CUGAUGA	X	GAA	AAGGUCCU	AGGACCUUU	UCAAGGAC
	3607	CGUCCUUG	CUGAUGA	X	GAA	AAAGGUCC	GGACCUUUU	CAAGGACG
15	3608	CCGUCCUU	CUGAUGA	X	GAA	AAAAGGUC	GACCUUUUC	AAGGACGG
	3619	GAUCUGCA	CUGAUGA	X	GAA	AGCCGUCC	GGACGGCUU	UGCAGauc
	3620	GGAUCUGC	CUGAUGA	X	GAA	AAGCCGUC	GACGGCUUU	GCAGAUCC
	3627	AAA AUGUG	CUGAUGA	X	GAA	AUCUGCAA	UUGCAGauc	CACAUUUU
	3633	GGAAUGAA	CUGAUGA	X	GAA	AUGUGGAU	AUCCACAUU	UUCAUucc
20	3634	CGGAAUGA	CUGAUGA	X	GAA	AAUGUGGA	UCCACAUUU	UCAUuccG
	3635	CCGGAAUG	CUGAUGA	X	GAA	AAAUGUGG	CCACAUUUU	CAUuccGG
	3636	UCCGGAAU	CUGAUGA	X	GAA	AAA AUGUG	CACAUUUUC	AUuccGGA
	3639	GCUUCCGG	CUGAUGA	X	GAA	AUGAAAAU	AUUUUCAUU	CCGGAAGC
	3640	AGCUUCCG	CUGAUGA	X	GAA	AAUGAAAA	UUUUCAUUC	CGGAAGCU
25	3649	CAUCAUCA	CUGAUGA	X	GAA	AGCUUCCG	CGGAAGCUC	UGAUGAUG
	3664	CGUUUACA	CUGAUGA	X	GAA	AUCUCACA	UGUGAGAU	UGUAAACG
	3668	AAAGCGUU	CUGAUGA	X	GAA	ACAUAUUCU	AGAU AUGUA	AACGCUUU
	3675	GAAUUUGA	CUGAUGA	X	GAA	AGCGUUUA	UAAACGCUU	UCAAAUUC
	3676	UGAAUUUG	CUGAUGA	X	GAA	AAGCGUUU	AAACGCUUU	CAAAUUCA
30	3677	AUGAAUUU	CUGAUGA	X	GAA	AAAGCGUU	AACGCUUUC	AAAUUCAU
	3682	GGCUCAUG	CUGAUGA	X	GAA	AUUUGAAA	UUUCAAAUU	CAUGAGCC
	3683	AGGCUCAU	CUGAUGA	X	GAA	AAUUUGAA	UUCAAAUUC	AUGAGCCU
	3701	AAGGUUUU	CUGAUGA	X	GAA	AUUCUUUC	GAAAGAAUC	AAAACCUU



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	3709	GCUCCUCA CUGAUGA X GAA AGGUUUUG	CAAAACCUU UGAGGAGC
	3710	AGCUCCUC CUGAUGA X GAA AAGGUUUU	AAAACCUU GAGGAGCU
	3719	UUCGGUGA CUGAUGA X GAA AGCUCCUC	GAGGAGCUU UCACCGAA
	3720	GUUCGGUG CUGAUGA X GAA AAGCUCCU	AGGAGCUU CACCGAAC
5	3721	AGUUCGGU CUGAUGA X GAA AAAGCUCC	GGAGCUUUC ACCGAACU
	3730	UGGAGGUG CUGAUGA X GAA AGUUCGGU	ACCGAACUC CACCUCCA
	3736	CAAACAUG CUGAUGA X GAA AGGUGGAG	CUCCACCUC CAUGUUUG
	3742	AGUCCUCA CUGAUGA X GAA ACAUGGAG	CUCCAUGUU UGAGGACU
	3743	UAGUCCUC CUGAUGA X GAA AACAUUGA	UCCAUGUUU GAGGACUA
10	3751	CCAGCUGA CUGAUGA X GAA AGUCCUCA	UGAGGACUA UCAGCUGG
	3753	GUCCAGCU CUGAUGA X GAA AUAGUCCU	AGGACUAUC AGCUGGAC
	3765	CAGAGUGC CUGAUGA X GAA AGUGUCCA	UGGACACUA GCACUCUG
	3771	GCCCAGCA CUGAUGA X GAA AGUGCUAG	CUAGCACUC UGCUGGGC
	3781	GCAAGGGG CUGAUGA X GAA AGCCCAGC	GCUGGGCUC CCCCUGC
15	3787	GCUUCAGC CUGAUGA X GAA AGGGGGAG	CUCCCCCUU GCUGAAGC
	3799	UCCAGGUG CUGAUGA X GAA ACCGCUUC	GAAGCGGUU CACCUGGA
	3800	GUCCAGGU CUGAUGA X GAA AACCPCUU	AAGCGGUUC ACCUGGAC
	3829	UCUUCAUG CUGAUGA X GAA AGGCCUUG	CAAGGCCUC CAUGAAGA
	3839	CUCAAGUC CUGAUGA X GAA AUCUUCAU	AUGAAGAUU GACUUGAG
20	3844	CUAUUCUC CUGAUGA X GAA AGUCUAUC	GAUAGACUU GAGAAUAG
	3851	UUACUCGC CUGAUGA X GAA AUUCUCAA	UUGAGAAUA GCGAGUAA
	3858	CUUGCUIU CUGAUGA X GAA ACUCGCUA	UAGCGAGUA AAAGCAAG
	3878	AGAUCGGA CUGAUGA X GAA AGUCCCGC	GCGGGACUU UCCGAUCU
	3879	CAGAUCCG CUGAUGA X GAA AAGUCCCG	CGGGACUUU CCGAUCUG
25	3880	GCAGAUCC CUGAUGA X GAA AAAGUCCC	GGGACUUUC CGAUCUGC
	3885	CCUCGGCA CUGAUGA X GAA AUCGGAAA	UUUCCGAUC UGCCGAGG
	3901	AGAAGCAG CUGAUGA X GAA AGCUGGGC	GCCCAGCUU CUGCUUCU
	3902	GAGAAGCA CUGAUGA X GAA AAGCUGGG	CCCAGCUUC UGCUUCUC
	3907	AGCUGGAG CUGAUGA X GAA AGCAGAAG	CUUCUGCUU CUCCAGCU
30	3908	CAGCUGGA CUGAUGA X GAA AAGCAGAA	UUCUGCUUC UCCAGCUG
	3910	CACAGCUG CUGAUGA X GAA AGAAGCAG	CUGCUUCUC CAGCUGUG
	3926	ACGGGCCU CUGAUGA X GAA AUGUGGCC	GGCCACAUC AGGCCCGU
	3949	CCAGCUCU CUGAUGA X GAA AUUCAUCG	CGAUGAAUC UGAGCUGG

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	3967	AACAGCAG	CUGAUGA	X	GAA	ACUCCUUU	AAAGGAGUC	CUGCUGUU
	3975	GGGUGGAG	CUGAUGA	X	GAA	ACAGCAGG	CCUGCUGUU	CUCCACCC
	3976	GGGGUGGA	CUGAUGA	X	GAA	AACAGCAG	CUGCUGUUC	UCCACCCC
	3978	UGGGGGUG	CUGAUGA	X	GAA	AGAACAGC	GCUGUUCUC	CACCCCCA
5	3991	CGGAGUUG	CUGAUGA	X	GAA	AGUCUGGG	CCCAGACUA	CAACUCCG
	3997	ACACCACG	CUGAUGA	X	GAA	AGUUGUAG	CUACAACUC	CGUGGUGU
	4006	AGGAGUAC	CUGAUGA	X	GAA	ACACCACG	CGUGGUGUU	GUACUCCU
	4009	GGGAGGAG	CUGAUGA	X	GAA	ACAACACC	GGUGUUGUA	CUCCUCCC
	4012	GCGGGGAG	CUGAUGA	X	GAA	AGUACAAC	GUUGUACUC	CUCCCCGC
10	4015	CGGGCGGG	CUGAUGA	X	GAA	AGGAGUAC	GUACUCCUC	CCCGCCCC
	4027	AGAAGCUU	CUGAUGA	X	GAA	AGGCGGGC	GCCCGCCUA	AAGCUUCU
	4033	CUGGUGAG	CUGAUGA	X	GAA	AGCUUUAG	CUAAAGCUU	CUCACCAG
	4034	GCUGGUGA	CUGAUGA	X	GAA	AAGCUUUA	UAAAGCUUC	UCACCAGC
	4036	GGGCUGGU	CUGAUGA	X	GAA	AGAAGCUU	AAGCUUCUC	ACCAGCCC
15	4066	AUGUAUAA	CUGAUGA	X	GAA	ACUGUCAG	CUGACAGUA	UUAUACAU
	4068	AGAUGUAU	CUGAUGA	X	GAA	AUACUGUC	GACAGUAUU	AUACAUCU
	4069	UAGAUGUA	CUGAUGA	X	GAA	AAUACUGU	ACAGUAUUA	UACAUCUA
	4071	CAUAGAUG	CUGAUGA	X	GAA	AUAAUACU	AGUAUUAUA	CAUCUAUG
	4075	AACUCAUA	CUGAUGA	X	GAA	AUGUAUAA	UUAUACAUC	UAUGAGUU
20	4077	UAAACUCA	CUGAUGA	X	GAA	AGAUGUAU	AUACAUCUA	UGAGUUUA
	4083	UAGGUGUA	CUGAUGA	X	GAA	ACUCAUAG	CUAUGAGUU	UACACCUA
	4084	AUAGGUGU	CUGAUGA	X	GAA	AACUCAUA	UAUGAGUUU	ACACCUAU
	4085	AAUAGGUG	CUGAUGA	X	GAA	AAACUCAU	AUGAGUUUA	CACCUAUU
	4091	GAGCGGAA	CUGAUGA	X	GAA	AGGUGUAA	UUACACCUA	UUCCGCUC
25	4093	UGGAGCGG	CUGAUGA	X	GAA	AUAGGUGU	ACACCUAUU	CCGCUCCA
	4094	GUGGAGCG	CUGAUGA	X	GAA	AAUAGGUG	CACCUAUUC	CGCUCCAC
	4099	CUCCUGUG	CUGAUGA	X	GAA	AGCGGAAU	AUCCCGCUC	CACAGGAG
	4117	GUCACGAA	CUGAUGA	X	GAA	AGCAGCUG	CAGCUGCUU	UUCGUGAC
	4118	GGUCACGA	CUGAUGA	X	GAA	AAGCAGCU	AGCUGCUUU	UCGUGACC
30	4119	AGGUCACG	CUGAUGA	X	GAA	AAAGCAGC	GCUGCUUUU	CGUGACCU
	4120	AAGGUCAC	CUGAUGA	X	GAA	AAAAGCAG	CUGCUUUUC	GUGACCUU
	4128	CACGAUUA	CUGAUGA	X	GAA	AGGUCACG	CGUGACCUU	UAAUCGUG
	4129	GCACGAUU	CUGAUGA	X	GAA	AAGGUCAC	GUGACCUUU	AAUCGUGC

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	4130	AGCACGAU	CUGAUGA	X	GAA	AAAGGUCA	UGACCUUUA	AUCGUGCU
	4133	AAAAGCAC	CUGAUGA	X	GAA	AUUAAGG	CCUUUAUC	GUGCUUUU
	4139	AAACAAAA	CUGAUGA	X	GAA	AGCACGAU	AUCGUGCUU	UUUGUUUU
	4140	AAAACAAA	CUGAUGA	X	GAA	AAGCACGA	UCGUGCUUU	UUUGUUUU
5	4141	AAAAACAA	CUGAUGA	X	GAA	AAAGCACG	CGUGCUUUU	UUUGUUUU
	4142	AAAAAACA	CUGAUGA	X	GAA	AAAAGCAC	GUGCUUUUU	UGUUUUUU
	4143	CAAAAAAC	CUGAUGA	X	GAA	AAAAAGCA	UGCUIUUUU	GUUUUUUG
	4146	AAACAAAA	CUGAUGA	X	GAA	ACAAAAAA	UUUUUGUUU	UUUGUUUU
	4147	AAAACAAA	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	UUUGUUUU
10	4148	CAAAACAA	CUGAUGA	X	GAA	AAACAAAA	UUUUUGUUU	UUUGUUUU
	4149	ACAAACAA	CUGAUGA	X	GAA	AAAACAAA	UUUGUUUUU	UGUUUUUGU
	4150	AACAAAC	CUGAUGA	X	GAA	AAAAACAA	UUUGUUUUU	GUUUUGUUU
	4153	ACAAACAA	CUGAUGA	X	GAA	ACAAAAAA	UUUUUGUUU	UUUGUUUU
	4154	AACAAACA	CUGAUGA	X	GAA	AACAAAAA	UUUUUGUUU	UGUUUGUUU
15	4155	CAACAAAC	CUGAUGA	X	GAA	AAACAAAA	UUUUUGUUU	GUUUUGUUU
	4158	CAACAACA	CUGAUGA	X	GAA	ACAAACAA	UGUUUGUUU	UGUUUGUUU
	4159	GCAACAAC	CUGAUGA	X	GAA	AACAAAC	GUUUUGUUU	GUUGUUGC
	4162	ACAGCAAC	CUGAUGA	X	GAA	ACAAACAA	UUUUUGUUU	GUUGCUGU
	4165	AAAACAGC	CUGAUGA	X	GAA	ACAACAAA	UUUUUGUUU	GCUGUUUU
20	4171	UUAGUCA	CUGAUGA	X	GAA	ACAGCAAC	GUUGCUGUU	UUAGCUAA
	4172	GUUAGUCA	CUGAUGA	X	GAA	AACAGCAA	UUUGCUGUU	UGACUAAAC
	4173	UGUUAGUC	CUGAUGA	X	GAA	AAACAGCA	UGCUGUUUU	GACUAACA
	4178	AUUCUUGU	CUGAUGA	X	GAA	AGUCAAAA	UUUUAGCUA	ACAAGAAU
	4189	ACUGGGGU	CUGAUGA	X	GAA	ACAUUCUU	AAGAAUGUA	ACCCAGU
25	4198	ACGUCACU	CUGAUGA	X	GAA	ACUGGGGU	ACCCAGUUU	AGUGACGU
	4199	CACGUCAC	CUGAUGA	X	GAA	AACUGGGG	CCCCAGUUA	GUGACGUG
	4216	AACAAUAG	CUGAUGA	X	GAA	AUUCUUCA	UGAAGAAUA	CUAUUGUU
	4219	UCUAACAA	CUGAUGA	X	GAA	AGUAUUCU	AGAAUACUA	UUUUUAGA
	4221	UCUCUAAAC	CUGAUGA	X	GAA	AUAGUAUU	AAUACUAUU	GUUAGAGA
30	4224	AUUUCUCU	CUGAUGA	X	GAA	ACAAUAGU	ACUAUUGUU	AGAGAAAU
	4225	GAUUUCUC	CUGAUGA	X	GAA	AACAAUAG	CUAUUGUUA	GAGAAAU
	4233	GCGGGGGG	CUGAUGA	X	GAA	AUUUCUCU	AGAGAAAU	CCCCCGC
	4249	GUUACCCU	CUGAUGA	X	GAA	AGGCUUUG	CAAAGCCUC	AGGGUAAC

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	4255	GUCCAGGU	CUGAUGA	X	GAA	ACCCUGAG	CUCAGGGUA	ACCUGGAC
	4282	GGUCGCCA	CUGAUGA	X	GAA	AGGCACCU	AGGUGCCUC	UGGCGACC
	4323	GCUGCAGG	CUGAUGA	X	GAA	AGGGUGGG	CCCACCCUC	CCUGCAGC
	4341	ACUGCCUC	CUGAUGA	X	GAA	AGUCCAC	GUGGGACUA	GAGGCAGU
5	4350	AAUGGGCU	CUGAUGA	X	GAA	ACUGCCUC	GAGGCAGUA	AGCCCAU
	4358	CAUGAGCU	CUGAUGA	X	GAA	AUGGGCUU	AAGCCCAU	AGCUCAUG
	4359	CCAUGAGC	CUGAUGA	X	GAA	AAUGGGCU	AGCCCAU	GCUCAUGG
	4363	GCAGCCAU	CUGAUGA	X	GAA	AGCUAAUG	CAUAGCUC	AUGGCUGC
	4387	GAGAGACA	CUGAUGA	X	GAA	AGCAGGUC	GACCUGCUC	UGUCUCUC
10	4391	AUAAGAGA	CUGAUGA	X	GAA	ACAGAGCA	UGCUCUGUC	UCUCUUAU
	4393	CCAUAGA	CUGAUGA	X	GAA	AGACAGAG	CUCUGUCUC	UCUUAUGG
	4395	CUCCAUA	CUGAUGA	X	GAA	AGAGACAG	CUGUCUCUC	UUAUGGAG
	4397	UCCUCCAU	CUGAUGA	X	GAA	AGAGAGAC	GUCUCUCU	AUGGAGGA
	4398	UUCCUCCA	CUGAUGA	X	GAA	AAGAGAGA	UCUCUCUA	UGGAGGAA
15	4445	GCAUCCCA	CUGAUGA	X	GAA	AGCCUUU	AAAAGGCU	UGGGAUGC
	4446	CGCAUCCC	CUGAUGA	X	GAA	AAGCCUU	AAAGGCU	GGGAUGCG
	4456	ACAGGACG	CUGAUGA	X	GAA	ACGCAUCC	GGAUGCGUC	CGUCCUGU
	4460	CUCCACAG	CUGAUGA	X	GAA	ACGGACGC	GCGUCCGUC	CUGUGGAG
	4487	GCAUAGCG	CUGAUGA	X	GAA	AGCCCCU	AGGGGGCUC	CGCUAUGC
20	4492	AAGUGGCA	CUGAUGA	X	GAA	AGCGGAGC	GCUCCGCUA	UGCCACUU
	4500	AGUCACUG	CUGAUGA	X	GAA	AGUGGCAU	AUGCCACU	CAGUGACU
	4501	AAGUCACU	CUGAUGA	X	GAA	AAGUGGCA	UGCCACU	AGUGACU
	4509	GGAGUGAG	CUGAUGA	X	GAA	AGUCACUG	CAGUGACU	CUCACUCC
	4510	AGGAGUGA	CUGAUGA	X	GAA	AAGUCACU	AGUGACU	UCACUCCU
25	4512	CCAGGAGU	CUGAUGA	X	GAA	AGAAGUCA	UGACUUCUC	ACUCCUGG
	4516	GAGGCCAG	CUGAUGA	X	GAA	AGUGAGAA	UUCUCACUC	CUGGCCUC
	4524	AAACAGCG	CUGAUGA	X	GAA	AGGCCAGG	CCUGGCCUC	CGCUGUUU
	4531	GGGCCCCG	CUGAUGA	X	GAA	ACAGCGGA	UCCGCUGU	UCGGGCCC
	4532	GGGGCCCCG	CUGAUGA	X	GAA	AACAGCGG	CCGCUGUU	CGGGCCCC
30	4533	GGGGGCCC	CUGAUGA	X	GAA	AAACAGCG	CGCUGUU	GGGGCCCC
	4543	CCUCUUGG	CUGAUGA	X	GAA	AGGGGGCC	GGCCCCCU	CCAAGAGG
	4544	ACCUCUUG	CUGAUGA	X	GAA	AAGGGGGC	GCCCCCU	CAAGAGGU
	4553	UGCUCUGA	CUGAUGA	X	GAA	ACCUCUUG	CAAGAGGUA	UCAGAGCA

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4555	UCUGCUCU	CUGAUGA	X	GAA	AUACCUCU	AGAGGUAUC	AGAGCAGA	
4577	GUCUAGGA	CUGAUGA	X	GAA	ACGUCCCU	AGGGACGUU	UCCUAGAC	
4578	GGUCUAGG	CUGAUGA	X	GAA	AACGUCCC	GGGACGUUU	CCUAGACC	
4579	UGGUCUAG	CUGAUGA	X	GAA	AAACGUCC	GGACGUUUC	CUAGACCA	
5	4582	CCCUGGUC	CUGAUGA	X	GAA	AGGAAACG	CGUUUCCUA	GACCAGGG
4598	UUCCCGAG	CUGAUGA	X	GAA	ACAUGUGC	GCACAUGUU	CUCGGGAA	
4599	GUUCCCGA	CUGAUGA	X	GAA	AACAUGUG	CACAUGUUC	UCGGGAAC	
4601	UGGUUCCC	CUGAUGA	X	GAA	AGAACAUG	CAUGUUCUC	GGGAACCA	
4614	UUAAGAUU	CUGAUGA	X	GAA	ACUGUGGU	ACCACAGUU	AAUCUUAA	
10	4615	UUUAAGAU	CUGAUGA	X	GAA	AACUGUGG	CCACAGUUA	AUCUUAAA
4618	AGAUUUAA	CUGAUGA	X	GAA	AUUAACUG	CAGUUAAUC	UUAAAUCU	
4620	AAAGAUUU	CUGAUGA	X	GAA	AGAUUAAC	GUUAAUCUU	AAAUCUUU	
4621	AAAAGAUU	CUGAUGA	X	GAA	AAGAUUAA	UUAAUCUUA	AAUCUUUU	
4625	CGGGAAAA	CUGAUGA	X	GAA	AUUUAAGA	UCUUAAAUC	UUUUCCCG	
15	4627	CCCGGGAA	CUGAUGA	X	GAA	AGAUUUAA	UUAAAUCUU	UUCCCGGG
4628	UCCCGGGA	CUGAUGA	X	GAA	AAGAUUUA	UAAAUCUUU	UCCCGGGA	
4629	CUCCCGGG	CUGAUGA	X	GAA	AAAGAUUU	AAAUCUUUU	CCCGGGAG	
4630	ACUCCCGG	CUGAUGA	X	GAA	AAAAGAUU	AAUCUUUUC	CCGGGAGU	
4639	CAACAGAA	CUGAUGA	X	GAA	ACUCCCGG	CCGGGAGUC	UUCUGUUG	
20	4641	GACAACAG	CUGAUGA	X	GAA	AGACUCCC	GGGAGUCUU	CUGUUGUC
4642	AGACAACA	CUGAUGA	X	GAA	AAGACUCC	GGAGUCUUC	UGUUGUCU	
4646	AAACAGAC	CUGAUGA	X	GAA	ACAGAAGA	UCUUCUGUU	GUCUGUUU	
4649	GGUAAACA	CUGAUGA	X	GAA	ACAACAGA	UCUGUUGUC	UGUUUACC	
4653	GGAUGGUA	CUGAUGA	X	GAA	ACAGACAA	UUGUCUGUU	UACCAUCC	
25	4654	UGGAUGGU	CUGAUGA	X	GAA	AACAGACA	UGUCUGUUU	ACCAUCCA
4655	UUGGAUGG	CUGAUGA	X	GAA	AAACAGAC	GUCUGUUUA	CCAUCCAA	
4660	AUGCUUUG	CUGAUGA	X	GAA	AUGGUAAA	UUUACCAUC	CAAAGCAU	
4669	AUGUUAAA	CUGAUGA	X	GAA	AUGCUUUG	CAAAGCAUA	UUUAACAU	
4671	ACAUGUUA	CUGAUGA	X	GAA	AUAUGCUU	AAGCAUAUU	UAACAUGU	
30	4672	CACAUGUU	CUGAUGA	X	GAA	AAUAUGCU	AGCAUAUUU	AACAUGUG
4673	ACACAUGU	CUGAUGA	X	GAA	AAUAUGC	GCAUAUUUA	ACAUGUGU	
4682	CCCCCACU	CUGAUGA	X	GAA	ACACAUGU	ACAUGUGUC	AGUGGGGG	
4698	CAGAAGCC	CUGAUGA	X	GAA	AGCGCCAC	GUGGCGCUU	GGCUUCUG	

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4703	GGCCUCAG	CUGAUGA	X	GAA	AGCCAAGC	GCUUGGCUU	CUGAGGCC
4704	UGGCCUCA	CUGAUGA	X	GAA	AAGCCAAG	CUUGGCUUC	UGAGGCCA
4720	GAACUGAU	CUGAUGA	X	GAA	AUGGCUCU	AGAGCCAUC	AUCAGUUC
4723	GAGGAACU	CUGAUGA	X	GAA	AUGAUGGC	GCCAUCAUC	AGUUCCUC
5 4727	ACUAGAGG	CUGAUGA	X	GAA	ACUGAUGA	UCAUCAGUU	CCUCUAGU
4728	CACUAGAG	CUGAUGA	X	GAA	AACUGAUG	CAUCAGUUC	CUCUAGUG
4731	UCUCACUA	CUGAUGA	X	GAA	AGGAACUG	CAGUUCCUC	UAGUGAGA
4733	CAUCUCAC	CUGAUGA	X	GAA	AGAGGAAC	GUUCCUCUA	GUGAGAUG
4745	AUGACCUC	CUGAUGA	X	GAA	AUGCAUCU	AGAUGCAUU	GAGGUCAU
10 4751	UUGGGUUA	CUGAUGA	X	GAA	ACCUCAAU	AUUGAGGUC	AUACCCAA
4754	AGCUUGGG	CUGAUGA	X	GAA	AUGACCUC	GAGGUCAUA	CCCAAGCU
4763	AGGCCUGC	CUGAUGA	X	GAA	AGCUUGGG	CCCAAGCUU	GCAGGCCU
4777	AGUAUGCG	CUGAUGA	X	GAA	AGGUCAGG	CCUGACCUU	CGCAUACU
4778	CAGUAUGC	CUGAUGA	X	GAA	AAGGUCAG	CUGACCUUC	GCAUACUG
15 4783	GUGAGCAG	CUGAUGA	X	GAA	AUGCGAAG	CUUCGCAUA	CUGCUCAC
4789	CUCCCCGU	CUGAUGA	X	GAA	AGCAGUAU	AUACUGCUC	ACGGGGAG
4799	GACCACUU	CUGAUGA	X	GAA	ACUCCCCG	CGGGGAGUU	AAGUGGUC
4800	GGACCACU	CUGAUGA	X	GAA	AACUCCCC	GGGGAGUUA	AGUGGUCC
4807	CCAAACUG	CUGAUGA	X	GAA	ACCACUUA	UAAGUGGUC	CAGUUUGG
20 4812	CUAGGCCA	CUGAUGA	X	GAA	ACUGGACC	GGUCCAGUU	UGGCCUAG
4813	ACUAGGCC	CUGAUGA	X	GAA	AACUGGAC	GUCCAGUUU	GGCCUAGU
4819	AACCUUAC	CUGAUGA	X	GAA	AGGCCAAA	UUUGGCCUA	GUAAGGUU
4822	GGCAACCU	CUGAUGA	X	GAA	ACUAGGCC	GGCCUAGUA	AGGUUGCC
4827	CAGUAGGC	CUGAUGA	X	GAA	ACCUUACU	AGUAAGGUU	GCCUACUG
25 4832	CCCAUCAG	CUGAUGA	X	GAA	AGGCAACC	GGUUGCCUA	CUGAUGGG
4843	UGGCUUUU	CUGAUGA	X	GAA	AGCCCAUC	GAUGGGCUC	AAAAGCCA
4855	CUGUUUAA	CUGAUGA	X	GAA	AUGUGGCU	AGCCACAUU	UUAAACAG
4856	CCUGUUUA	CUGAUGA	X	GAA	AAUGUGGC	GCCACAUUU	UAAACAGG
4857	ACCUGUUU	CUGAUGA	X	GAA	AAAUGUGG	CCACAUUUU	AAACAGGU
30 4858	AACCUGUU	CUGAUGA	X	GAA	AAAUGUG	CACAUUUUA	AACAGGUU
4866	UGAGAUAA	CUGAUGA	X	GAA	ACCUGUUU	AAACAGGUU	UUAUCUCA
4867	UUGAGAUU	CUGAUGA	X	GAA	AACCUGUU	AACAGGUUU	UAUCUCAA
4868	CUUGAGAU	CUGAUGA	X	GAA	AAACCUGU	ACAGGUUUU	AUCUCAAG

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4869	ACUUGAGA CUGAUGA X GAA AAAACCCUG	CAGGUUUUA UCUCAAGU
4871	AUACUUGA CUGAUGA X GAA AUAAAACC	GGUUUUUUC UCAAGUAU
4873	UAAUACUU CUGAUGA X GAA AGAUAAAA	UUUUUUCUC AAGUAUUA
4878	UAUAUUA CUGAUGA X GAA ACUUGAGA	UCUCAAGUA UUAUAUA
5 4880	UAUAUAUU CUGAUGA X GAA AUACUUGA	UCAAGUAUU AAUAUAUA
4881	CUAUUAUU CUGAUGA X GAA AAUACUUG	CAAGUAUUA AUUAUAUG
4884	UGUCUAUA CUGAUGA X GAA AUUAAUAC	GUAUUAAUA UUAAGACA
4886	CUUGUCUA CUGAUGA X GAA AUUUAAU	AUUAAUAUA UAGACAAG
4888	GUCUUGUC CUGAUGA X GAA AUUAUAUA	UAAUAUAUA GACAAGAC
10 4900	UAAUGCAU CUGAUGA X GAA AGUGUCUU	AAGACACUU AUGCAUUA
4901	AUAAUGCA CUGAUGA X GAA AAGUGUCU	AGACACUUA UGCAUUAU
4907	AACAGGAU CUGAUGA X GAA AUGCAUAA	UUAUGCAUU AUCCUGUU
4908	AAACAGGA CUGAUGA X GAA AAUGCAUA	UAUGCAUUA UCCUGUUU
4910	UAAAACAG CUGAUGA X GAA AUAAUGCA	UGCAUUAUC CUGUUUUA
15 4915	AUAUAUAA CUGAUGA X GAA ACAGGAUA	UAUCCUGUU UUAUAUAU
4916	GAUAUAUA CUGAUGA X GAA AACAGGAU	AUCCUGUUU UUAUAUUC
4917	GGUAUAUA CUGAUGA X GAA AAACAGGA	UCCUGUUUU AUUAUCC
4918	UGGAUAUA CUGAUGA X GAA AAAACAGG	CCUGUUUUA UUAUCCA
4920	AUUGGAUA CUGAUGA X GAA AUAAAACA	UGUUUUUAU UAUCCAAU
20 4922	UCAUUGGA CUGAUGA X GAA AUUAUAAA	UUUUAUAUA UCCAAUGA
4924	AUUCAUUG CUGAUGA X GAA AUUAUAUA	UUAUAUAUC CAAUGAAU
4933	CCCAGUUA CUGAUGA X GAA AUUCAUUG	CAAUGAAUA UAACUGGG
4935	GCCCCAGU CUGAUGA X GAA AUUUUCAU	AUGAAUAUA ACUGGGGC
4948	UGACUCUU CUGAUGA X GAA ACUCGCCC	GGGCGAGUU AAGAGUCA
25 4949	AUGACUCU CUGAUGA X GAA AACUCGCC	GGCGAGUUA AGAGUCAU
4955	UAGACCAU CUGAUGA X GAA ACUCUUA	UUAAGAGUC AUGGUCUA
4961	CUUUUCUA CUGAUGA X GAA ACCAUGAC	GUCAUGGUC UAGAAAAG
4963	CCCUUUUC CUGAUGA X GAA AGACCAUG	CAUGGUCUA GAAAAGGG
4974	UACAGAGA CUGAUGA X GAA ACCCCUUU	AAAGGGGUU UCUCUGUA
30 4975	GUACAGAG CUGAUGA X GAA AACCCCUU	AAGGGGUUU CUCUGUAC
4976	GGUACAGA CUGAUGA X GAA AAACCCCU	AGGGGUUUC UCUGUACC
4978	UGGGUACA CUGAUGA X GAA AGAAACCC	GGGUUUCUC UGUACCCA
4982	GAUUUGGG CUGAUGA X GAA ACAGAGAA	UUCUCUGUA CCCAAUUC

	4990	ACCAGCCC	CUGAUGA	X	GAA	AUUUGGGU	ACCCAAAUC	GGGCUGGU
	4999	CUUGGUCC	CUGAUGA	X	GAA	ACCAGCCC	GGGCUGGUU	GGACCAAG
	5029	GCUGGGAC	CUGAUGA	X	GAA	ACCACUCU	AGAGUGGUU	GUCCCAGC
	5032	AUAGCUGG	CUGAUGA	X	GAA	ACAACCAC	GUGGUUGUC	CCAGCUAU
5	5039	AGUAACUA	CUGAUGA	X	GAA	AGCUGGGA	UCCCAGCUA	UAGUUACU
	5041	UUAGUAA	CUGAUGA	X	GAA	AUAGCUGG	CCAGCUAUA	GUUACUAA
	5044	AGUUUAGU	CUGAUGA	X	GAA	ACUUAUAG	GCUAUAGUU	ACUAAACU
	5045	UAGUUUAG	CUGAUGA	X	GAA	AACUUAUAG	CUAUAGUUA	CUAAACUA
	5048	GAGUAGUU	CUGAUGA	X	GAA	AGUAACUA	UAGUUACUA	AACUACUC
10	5053	UGGGUGAG	CUGAUGA	X	GAA	AGUUUAGU	ACUAAACUA	CUCACCCA
	5056	CUUUGGGU	CUGAUGA	X	GAA	AGUAGUUU	AAACUACUC	ACCCAAAG
	5066	GAGGUCCC	CUGAUGA	X	GAA	ACUUUGGG	CCCAAAGUU	GGGACCUC
	5074	AAGCCAGU	CUGAUGA	X	GAA	AGGUCCCA	UGGGACCUC	ACUGGCUU
	5082	GUAAAGAG	CUGAUGA	X	GAA	AGCCAGUG	CACUGGCUU	CUCUUUAC
15	5083	AGUAAAGA	CUGAUGA	X	GAA	AAGCCAGU	ACUGGCUUC	UCUUUACU
	5085	GAAGUAAA	CUGAUGA	X	GAA	AGAAGCCA	UGGCUUCUC	UUUACUUC
	5087	AUGAAGUA	CUGAUGA	X	GAA	AGAGAAGC	GCUUCUCUU	UACUUCAU
	5088	GAUGAAGU	CUGAUGA	X	GAA	AAGAGAAG	CUUCUCUUU	ACUUCAUC
	5089	UGAUGAAG	CUGAUGA	X	GAA	AAAGAGAA	UUCUCUUUA	CUUCAUCA
20	5092	CCAUGAUG	CUGAUGA	X	GAA	AGUAAAGA	UCUUUACUU	CAUCAUGG
	5093	UCCAUGAU	CUGAUGA	X	GAA	AAGUAAAG	CUUUACUUC	AUCAUGGA
	5096	AAAUCCA	CUGAUGA	X	GAA	AUGAAGUA	UACUUCAUC	AUGGAUUU
	5103	GAUGGUGA	CUGAUGA	X	GAA	AUCCAUGA	UCAUGGAUU	UCACCAUC
	5104	GGAUGGUG	CUGAUGA	X	GAA	AAUCCAUG	CAUGGAUUU	CACCAUCC
25	5105	GGGAUGGU	CUGAUGA	X	GAA	AAAUCCA	AUGGAUUUC	ACCAUCCC
	5111	UGCCUUGG	CUGAUGA	X	GAA	AUGGUGAA	UUCACCAUC	CCAAGGCA
	5122	UCCUCUCA	CUGAUGA	X	GAA	ACUGCCUU	AAGGCAGUC	UGAGAGGA
	5134	AUACUCUU	CUGAUGA	X	GAA	AGCUCCUC	GAGGAGCUA	AAGAGUAU
	5141	UGGGCUGA	CUGAUGA	X	GAA	ACUCUUUA	UAAAGAGUA	UCAGCCCA
30	5143	UAUGGGCU	CUGAUGA	X	GAA	AUACUCUU	AAGAGUAUC	AGCCCAUA
	5151	UUAAUAAA	CUGAUGA	X	GAA	AUGGGCUG	CAGCCCAUA	UUUAUUAA
	5153	GCUUAAUA	CUGAUGA	X	GAA	AUAUGGGC	GCCCAUAUU	UAUUAAGC
	5154	UGCJUAAU	CUGAUGA	X	GAA	AAUAUGGG	CCCAUAUUU	AUUAAGCA



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5155	GUGCUUAA CUGAUGA X GAA AAAUAUGG	CCAUAUUUA UUAAGCAC
5157	AAGUGCUU CUGAUGA X GAA AUAAAUAU	AUAUUUAU AAGCACUU
5158	AAAGUGCU CUGAUGA X GAA AAUAAAUA	UAUUUAUUA AGCACUUU
5165	GGAGCAUA CUGAUGA X GAA AGUGCUUA	UAAGCACUU UAUGCUCU
5 5166	AGGAGCAU CUGAUGA X GAA AAGUGCUU	AAGCACUUU AUGCUCCU
5167	AAGGAGCA CUGAUGA X GAA AAAGUGCU	AGCACUUUA UGCUCUUU
5172	GUGCCAAG CUGAUGA X GAA AGCAUAAA	UUUAUGCUC CUUGGCAC
5175	GCUGUGCC CUGAUGA X GAA AGGAGCAU	AUGCUCUUU GGCACAGC
5195	GCAUAAAU CUGAUGA X GAA ACACAUCA	UGAUGUGUA AUUUUAUGC
10 5198	CUUGCAUA CUGAUGA X GAA AUUACACA	UGUGUAAUU UAUGCAAG
5199	GCUUGCAU CUGAUGA X GAA AAUACAC	GUGUAAUUU AUGCAAGC
5200	AGCUUGCA CUGAUGA X GAA AAUUAACA	UGUAAUUUA UGCAAGCU
5209	UGGAGAGG CUGAUGA X GAA AGCUUGCA	UGCAAGCUC CCUCUCCA
5213	UAGCUGGA CUGAUGA X GAA AGGGAGCU	AGCUCUCCUC UCCAGCUA
15 5215	CCUAGCUG CUGAUGA X GAA AGAGGGAG	CUCCUCCUC CAGCUAGG
5221	CUGAGUCC CUGAUGA X GAA AGCUGGAG	CUCCAGCUA GGACUCAG
5227	AAUAUCCU CUGAUGA X GAA AGUCCUAG	CUAGGACUC AGGAUAAU
5233	UUGACUAA CUGAUGA X GAA AUCCUGAG	CUCAGGAUA UUAGUCA
5235	CAUUGACU CUGAUGA X GAA AUAUCCUG	CAGGAUAAU AGUCAUUG
20 5236	UCAUUGAC CUGAUGA X GAA AAUAUCCU	AGGAUAAUA GUCAAUGA
5239	GGCUCAUU CUGAUGA X GAA ACUAAUAU	AUAUUAGUC AAUGAGCC
5250	UUCCUUUU CUGAUGA X GAA AUGGCUCA	UGAGCCAUC AAAAGGAA
5273	AAAUAAGA CUGAUGA X GAA AGGUUUUU	AAAAACCUA UCUUAAUU
5275	GAAAAUAA CUGAUGA X GAA AUAGGUUU	AAACCUAUC UUAUUUUC
25 5277	AUGAAAAU CUGAUGA X GAA AGAUAGGU	ACCUAUCUU AUUUUCAU
5278	GAUGAAAA CUGAUGA X GAA AAGAUAGG	CCUAUCUUA UUUUCAUC
5280	CAGAUGAA CUGAUGA X GAA AUAAGAU	UAUCUUAUU UUCAUCUG
5281	ACAGAUGA CUGAUGA X GAA AAUAAGAU	AUCUUAUUU UCAUCUGU
5282	AACAGAUG CUGAUGA X GAA AAAUAAGA	UCUUAUUUU CAUCUGUU
30 5283	AAACAGAU CUGAUGA X GAA AAAUAAG	CUUAUUUUC AUCUGUUU
5286	AUGAAACA CUGAUGA X GAA AUGAAAAU	AUUUUCAUC UGUUUCAU
5290	AGGUAUGA CUGAUGA X GAA ACAGAUGA	UCAUCUGUU UCAUACCU
5291	AAGGUAUG CUGAUGA X GAA AACAGAUG	CAUCUGUUU CAUACCUU

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	5292	CAAGGUUAU	CUGAUGA	X	GAA	AAACAGAU	AUCUGUUUC	AUACCUUG
	5295	AGACAAGG	CUGAUGA	X	GAA	AUGAAACA	UGUUUCAUA	CCUUGUCU
	5299	CCCCAGAC	CUGAUGA	X	GAA	AGGUAUGA	UCAUACCUU	GUCUGGGG
	5302	AGACCCCA	CUGAUGA	X	GAA	ACAAGGUA	UACCUUGUC	UGGGGUCU
5	5309	CGUCAUUA	CUGAUGA	X	GAA	ACCCAGAG	UCUGGGGUC	UAAUGACG
	5311	AUCGUCAU	CUGAUGA	X	GAA	AGACCCCA	UGGGGUCUA	AUGACGAU
	5331	CCCAUGUC	CUGAUGA	X	GAA	ACCCUGUU	AACAGGGUA	GACAUGGG
	5350	CCCUUUUC	CUGAUGA	X	GAA	ACCCUGUC	GACAGGGUA	GAAAAGGG
	5367	ACCCCAA	CUGAUGA	X	GAA	AGCGGGCA	UGCCCGCUC	UUUGGGGU
10	5369	AGACCCCA	CUGAUGA	X	GAA	AGAGCGGG	CCCGCUCUU	UGGGGUCU
	5370	UAGACCCC	CUGAUGA	X	GAA	AAGAGCGG	CCGCUCUUU	GGGGUCUA
	5376	CAUCUCUA	CUGAUGA	X	GAA	ACCCCAA	UUUGGGGUC	UAGAGAUG
	5378	CUCAUCUC	CUGAUGA	X	GAA	AGACCCCA	UGGGGUCUA	GAGAUGAG
	5395	AUUUUAGA	CUGAUGA	X	GAA	ACCCAGGG	CCCUGGGUC	UCUAAAAU
15	5397	CCAUUUUA	CUGAUGA	X	GAA	AGACCCAG	CUGGGUCUC	UAAAAUGG
	5399	AGCCAUUU	CUGAUGA	X	GAA	AGAGACCC	GGGUCUCUA	AAAUGGCU
	5408	UUCUAAGA	CUGAUGA	X	GAA	AGCCAUUU	AAAUGGCUC	UCUUAGAA
	5410	ACUUCUAA	CUGAUGA	X	GAA	AGAGCCAU	AUGGCUCUC	UUAGAAGU
	5412	CAACUUCU	CUGAUGA	X	GAA	AGAGAGCC	GGCUCUCUU	AGAAGUUG
20	5413	ACAACUUC	CUGAUGA	X	GAA	AAGAGAGC	GCUCUCUUA	GAAGUUGU
	5419	GCACAUAC	CUGAUGA	X	GAA	ACUUCUAA	UUAGAAGUU	GUAUGUGC
	5422	UUUGCACA	CUGAUGA	X	GAA	ACAACUUC	GAAGUUGUA	UGUGCAAA
	5432	CAGACCAU	CUGAUGA	X	GAA	AUUUGCAC	GUGCAAUUU	AUGGUCUG
	5433	ACAGACCA	CUGAUGA	X	GAA	AAUUUGCA	UGCAAUUUA	UGGUCUGU
25	5438	AGCACACA	CUGAUGA	X	GAA	ACCAUAAU	AUUAUGGUC	UGUGUGCU
	5447	CACGACCU	CUGAUGA	X	GAA	AGCACACA	UGUGUGCUU	AGGUCGUG
	5448	GCACGACC	CUGAUGA	X	GAA	AAGCACAC	GUGUGCUUA	GGUCGUGC
	5452	GUGUGCAC	CUGAUGA	X	GAA	ACCUAAGC	GCUUAGGUC	GUGCACAC
	5475	CCAGCUGU	CUGAUGA	X	GAA	ACCGGCUC	GAGCCGGUC	ACAGCUGG
30	5497	AAAGCAGC	CUGAUGA	X	GAA	AUUCAUCG	CGAUGAAUA	GCUGCUUU
	5504	CUCUCCCA	CUGAUGA	X	GAA	AGCAGCUA	UAGCUGCUU	UGGGAGAG
	5505	GCUCUCCC	CUGAUGA	X	GAA	AAGCAGCU	AGCUGCUUU	GGGAGAGC
	5524	UAAGUGGC	CUGAUGA	X	GAA	AGCAUGCU	AGCAUGCUA	GCCACUUA

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5531	AGAGAAUU	CUGAUGA	X	GAA	AGUGGCUA	UAGCCACUU	AAUUCUCU
5532	CAGAGAAU	CUGAUGA	X	GAA	AAGUGGCU	AGCCACUUA	AUUCUCUG
5535	GGUCAGAG	CUGAUGA	X	GAA	AUUAAGUG	CACUAAAUU	CUCUGACC
5536	CGGUCAGA	CUGAUGA	X	GAA	AAUUAAGU	ACUAAAUUC	UCUGACCG
5 5538	CCCGGUCA	CUGAUGA	X	GAA	AGAAUUA	UUAUUCUC	UGACCGGG
5554	GUACCCAU	CUGAUGA	X	GAA	AUGCUGGC	GCCAGCAUC	AUGGGUAC
5561	GGAGCAGG	CUGAUGA	X	GAA	ACCCAUGA	UCAUGGGUA	CCUGCUCC
5568	ACACAGGG	CUGAUGA	X	GAA	AGCAGGUA	UACCUGCUC	CCCUGUGU
5577	GGAUGGGG	CUGAUGA	X	GAA	ACACAGGG	CCCUGUGUA	CCCCAUCC
10 5584	ACCUAAG	CUGAUGA	X	GAA	AUGGGGUA	UACCCCAUC	CUUAAGGU
5587	AAAACCUU	CUGAUGA	X	GAA	AGGAUGGG	CCCAUCCUU	AAGGUUUU
5588	GAAAACCU	CUGAUGA	X	GAA	AAGGAUGG	CCAUCCUUA	AGGUUUUC
5593	AGACAGAA	CUGAUGA	X	GAA	ACCUAAG	CUUAAGGUU	UUCUGUCU
5594	CAGACAGA	CUGAUGA	X	GAA	AACCUUAA	UUAAGGUUU	UCUGUCUG
15 5595	UCAGACAG	CUGAUGA	X	GAA	AAACCUUA	UAAGGUUUU	CUGUCUGA
5596	AUCAGACA	CUGAUGA	X	GAA	AAAACCUU	AAGGUUUUC	UGUCUGAU
5600	UCUCAUCA	CUGAUGA	X	GAA	ACAGAAAA	UUUUCUGUC	UGAUGAGA
5627	UCAGUGGG	CUGAUGA	X	GAA	AUUGCACU	AGUGCAAUC	CCCACUGA
5660	UGCACCAA	CUGAUGA	X	GAA	AGCCACAG	CUGUGGCUC	UUGGUGCA
20 5662	AGUGCACC	CUGAUGA	X	GAA	AGAGCCAC	GUGGCUCUU	GGUGCACU
5671	UGGCUGGU	CUGAUGA	X	GAA	AGUGCACC	GGUGCACUC	ACCAGCCA
5685	UACUUGUC	CUGAUGA	X	GAA	AGUCCUGG	CCAGGACUA	GACAAGUA
5693	CCCUUUC	CUGAUGA	X	GAA	ACUUGUCU	AGACAAGUA	GGAAAGGG
5704	GUGGCUAG	CUGAUGA	X	GAA	AGCCCUUU	AAAGGGCUU	CUAGCCAC
25 5705	UGUGGCUA	CUGAUGA	X	GAA	AAGCCCUU	AAGGGCUUC	UAGCCACA
5707	AGUGUGGC	CUGAUGA	X	GAA	AGAAGCCC	GGGCUUCUA	GCCACACU
5731	CCCUACCU	CUGAUGA	X	GAA	AUUUUCUU	AAGAAAUC	AGGUAGGG
5736	GCCAGCCC	CUGAUGA	X	GAA	ACCUGAUU	AAUCAGGUA	GGGCUGGC
5754	UGGACAAA	CUGAUGA	X	GAA	AUGUCUUU	AAAGACAUC	UUUGUCCA
30 5756	AAUGGACA	CUGAUGA	X	GAA	AGAUGUCU	AGACAUCUU	UGUCCAUI
5757	GAAUGGAC	CUGAUGA	X	GAA	AAGAUGUC	GACAUCUUU	GUCCAUIU
5760	UGCGAAUG	CUGAUGA	X	GAA	ACAAAGAU	AUCUUGUC	CAUUCGCA
5764	CUUUUGCG	CUGAUGA	X	GAA	AUGGACAA	UUGUCCAUI	CGCAAAG

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5765	GCUUUUGC	CUGAUGA	X	GAA	AAUGGACA	UGUCCAUUC	GCAAAAGC
5775	GCCGACAA	CUGAUGA	X	GAA	AGCUUUUG	CAAAAGCUC	UUGUCGGC
5777	CAGCCGAC	CUGAUGA	X	GAA	AGAGCUUU	AAAGCUCUU	GUCGGCUG
5780	CUGCAGCC	CUGAUGA	X	GAA	ACAAGAGC	GCUCUUGUC	GGCUGCAG
5 5794	GCCUGACU	CUGAUGA	X	GAA	ACACACUG	CAGUGUGUA	AGUCAGGC
5798	CAUCGCCU	CUGAUGA	X	GAA	ACUUACAC	GUGUAAGUC	AGGCGAUG
5818	UUCUCUGG	CUGAUGA	X	GAA	AGCCUCUG	CAGAGGCUA	CCAGAGAA
5852	GGAUGAGA	CUGAUGA	X	GAA	ACCUCAGG	CCUGAGGUU	UCUCAUCC
5853	UGGAUGAG	CUGAUGA	X	GAA	AACCUCAG	CUGAGGUUU	CUCAUCCA
10 5854	CUGGAUGA	CUGAUGA	X	GAA	AAACCUCA	UGAGGUUUC	UCAUCCAG
5856	AUCUGGAU	CUGAUGA	X	GAA	AGAAACCU	AGGUUUCUC	AUCCAGAU
5859	GAUAUCUG	CUGAUGA	X	GAA	AUGAGAAA	UUUCUCAUC	CAGUAUUC
5865	UUGCUGGA	CUGAUGA	X	GAA	AUCUGGAU	AUCCAGAU	UCCAGCAA
5867	AAUUGCUG	CUGAUGA	X	GAA	AUAUCUGG	CCAGAUUUC	CAGCAAUU
15 5875	CACCCCCC	CUGAUGA	X	GAA	AUUGCUGG	CCAGCAAUU	GGGGGGUG
5896	GGACCAUC	CUGAUGA	X	GAA	AUGGUCUU	AAGACCAUA	GAUGGUCC
5903	UAAUACAG	CUGAUGA	X	GAA	ACCAUCUA	UAGAUGGUC	CUGUAUUA
5908	CGGAAUAA	CUGAUGA	X	GAA	ACAGGACC	GGUCCUGUA	UUAUCCG
5910	AUCGGAAU	CUGAUGA	X	GAA	AUACAGGA	UCCUGUAUU	AUCCGAU
20 5911	AAUCGGAA	CUGAUGA	X	GAA	AAUACAGG	CCUGUAUUA	UUCCGAUU
5913	AAAAUCGG	CUGAUGA	X	GAA	AUAAUACA	UGUAUUUUU	CCGAUUUU
5914	UAAAUCG	CUGAUGA	X	GAA	AAUAAUAC	GUUUUAUUC	CGAUUUUA
5919	AUUUAUAA	CUGAUGA	X	GAA	AUCGGAAU	AUCCGAUU	UUAUAUU
5920	GAUUAUUA	CUGAUGA	X	GAA	AAUCGGAA	UUCCGAUUU	UAAUAAUC
25 5921	AGAUUAUU	CUGAUGA	X	GAA	AAAUCGGA	UCCGAUUUU	AAUAAUCU
5922	UAGAUUAU	CUGAUGA	X	GAA	AAAUCGG	CCGAUUUUU	AUAAUCUA
5925	AAUUAGAU	CUGAUGA	X	GAA	AUUAAAAU	AUUUUAAUA	AUCUAAUU
5928	ACGAAUUA	CUGAUGA	X	GAA	AUUUAUAA	UUAAUAAUC	UAAUUCGU
5930	UCACGAAU	CUGAUGA	X	GAA	AGAUUAUU	AAUAAUCUA	AUUCGUGA
30 5933	UGAUCACG	CUGAUGA	X	GAA	AUUAGAUU	AAUCUAAUU	CGUGAUC
5934	AUGAUCAC	CUGAUGA	X	GAA	AAUUAGAU	AUCUAAUUC	GUGAUCAU
5940	CUCUUAUU	CUGAUGA	X	GAA	AUCACGAA	UUCGUGAUC	AUUAAGAG
5943	AGUCUCUU	CUGAUGA	X	GAA	AUGAUCAC	GUGAUCAUU	AAGAGACU

	5944	AAGUCUCU	CUGAUGA	X	GAA	AAUGAUC	UGAUCAUUA	AGAGACUU
	5952	AUUUACUA	CUGAUGA	X	GAA	AGUCUCUU	AAGAGACUU	UAGUAAAU
	5953	CAUUUACU	CUGAUGA	X	GAA	AAGUCUCU	AGAGACUUU	AGUAAAUG
	5954	ACAUUUAC	CUGAUGA	X	GAA	AAAGUCUC	GAGACUUUA	GUAAAUGU
5	5957	GGGACAUU	CUGAUGA	X	GAA	ACUAAAGU	ACUUUAGUA	AAUGUCCC
	5963	GGAAAAGG	CUGAUGA	X	GAA	ACAUUUAC	GUAAAUGUC	CCUUUUCC
	5967	UGUGGGAA	CUGAUGA	X	GAA	AGGGACAU	AUGUCCCUU	UUCCACAA
	5968	UUGUGGGA	CUGAUGA	X	GAA	AAGGGACA	UGUCCCUUU	UCCACAAA
	5969	UUUGUGGG	CUGAUGA	X	GAA	AAAGGGAC	GUCCCUUUU	CCCACAAA
10	5970	UUUUGUGG	CUGAUGA	X	GAA	AAAAGGGA	UCCCUUUUC	CCACAAAA
	5981	CUUUUCUU	CUGAUGA	X	GAA	ACUUUUGU	ACAAAAGUA	AAGAAAAG
	5992	AAUCCCGA	CUGAUGA	X	GAA	AGCUUUUC	GAAAAGCUA	UCGGGAUU
	5994	AGAAUCCC	CUGAUGA	X	GAA	AUAGCUUU	AAAGCUAUC	GGGAUUCU
	6000	AACCAGAG	CUGAUGA	X	GAA	AUCCCGAU	AUCGGGAUU	CUCUGGUU
15	6001	GAACCAGA	CUGAUGA	X	GAA	AAUCCCGA	UCGGGAUUC	UCUGGUUC
	6003	CAGAACCA	CUGAUGA	X	GAA	AGAAUCCC	GGGAUUCUC	UGGUUCUG
	6008	UUAAGCAG	CUGAUGA	X	GAA	ACCAGAGA	UCUCUGGUU	CUGCUUAA
	6009	UUUAAGCA	CUGAUGA	X	GAA	AACCAGAG	CUCUGGUUC	UGCUUAAA
	6014	AAGUCUUU	CUGAUGA	X	GAA	AGCAGAAC	GUUCUGCUU	AAAGACUU
20	6015	UAAGUCUU	CUGAUGA	X	GAA	AAGCAGAA	UUCUGCUUA	AAGACUUA
	6022	CCAAAGCU	CUGAUGA	X	GAA	AGUCUUUA	UAAAGACUU	AGCUUUGG
	6023	UCCAAAGC	CUGAUGA	X	GAA	AAGUCUUU	AAAGACUUA	GCUUUGGA
	6027	AGGCUCCA	CUGAUGA	X	GAA	AGCUAAGU	ACUUAGCUU	UGGAGCCU
	6028	UAGGCUCC	CUGAUGA	X	GAA	AAGCUAAG	CUUAGCUUU	GGAGCCUA
25	6036	AACUUUCA	CUGAUGA	X	GAA	AGGCUCCA	UGGAGCCUA	UGAAAGUU
	6044	GGCUGAUC	CUGAUGA	X	GAA	ACUUUCAU	AUGAAAGUU	GAUCAGCC

Where "X" represents stem II region of a HH ribozyme (Hertel et al., 1992 *Nucleic Acids Res.* 20 3252). The length of stem II may be  $\geq 2$  base-pairs.

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Table IX: Mouse *flt1* VEGF Receptor-Hairpin Ribozyme and Substrate Sequence

nt.		HP Ribozyme Sequence		Substrate
Position				
5	33	GUCCCAGC AGAA GACCAU ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	AUGGUCA GCU GCUGGGAC
	36	GGUGUCCC AGAA GCUGAC ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	GUCAGCU GCU GGGACACC
	50	UAAGGCCAA AGAA GCGGUG ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	CACCGCG GUC UUGCCUUA
	67	GACACCCG AGAA GCGCGU ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	ACGGGCU GCU CGGGUGUC
	79	CUGUGAGA AGAA GACACC ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	GGUGUCU GCU UCUCACAG
10	166	GAAAGAGA AGAA GGCCUG ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	CAGGCCA GAC UCUCUUUC
	197	CAUGAGUG AGAA GCCUCC ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	GGAGGCA GCC CACUCAUG
	214	CGGUCGUG AGAA GAGACC ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	GGUCUCU GCC CACGACCG
	266	CUCCCACA AGAA GAUGGG ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	CCCAUCG GCC UGUGGGAG
	487	GGAUGAUG AGAA GUCUUC ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	GAAGACA GCU CAUCAUCC
15	501	CGUCACCC AGAA GGGGAU ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	AUCCCCU GCC GGGUGACG
	566	CUUUGCCC AGAA GGGGUA ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	UACCCCU GAU GGGCAAAG
	640	CGCAGUUC AGAA GUCCUA ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	UAGGACU GCU GAAACUGCG
	691	GCCGAUGG AGAA GAUAGU ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	ACUAUCU GAC CCAUCGGC
	703	UUGUAUUG AGAA GCCGAU ACCAGAGAAAACACACGUUGUGGUA	CAUUACCUGGUA	AUCGGCA GAC CAAUACAA

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736	CUGGGCUC	AGAA	GGCGUA	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UACGCCC	GCC	GAGCCCCAG
754	GCCCCUGG	AGAA	GUCUCA	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UGAGACU	GCU	CCACGGGC
766	GGACAAGA	AGAA	GCCCCU	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	ACGGGCA	GAC	UCUUGUCC
871	UCCGGUCA	AGAA	GCUGCC	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GGCAGCG	GAU	UGACCGGA
5 960	CUUCACGC	AGAA	GGUGUA	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UACACCU	GUC	GGUGAAG
988	UGUUGAAA	AGAA	GGAACG	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CGUUGCA	GUC	UUUCAACA
1051	CCUGCACC	AGAA	GCUUC	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GGAAAGCA	GCC	GGUGCAGG
1081	GCCGAUAG	AGAA	GUCUUC	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GAAGACG	GUC	CUAUCGGC
1090	UCAUGGAC	AGAA	GAUAGG	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	CCUAUCG	GCU	GUCCAUGA
10 1093	CUUUC AUG	AGAA	GCCGAU	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	AUCGGCU	GUC	CAUGAAAG
1169	AAAUAGCG	AGAA	GACUUC	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GAAGUCU	GCU	CGCUAUUU
1315	UUUCGUAG	AGAA	GAGGUU	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	AAACCUCA	GAU	CUACGAAA
1363	UGCUGCCC	AGAA	GAUAGA	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UCUAUCC	GCU	GGGCAGCA
1604	GUCUGAGA	AGAA	GCCACC	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GGUGGCU	GAC	UCUCAGAC
15 1612	UUC CAGG	AGAA	GAGAGU	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	ACUCUCA	GAC	CCCUGGAA
1629	GCCCCGGC	AGAA	GUAGAU	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	AUCUACA	GCU	GCCGGGCC
1632	GAAGGCC	AGAA	GCUGUA	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UACAGCU	GCC	GGGCCUUC
1688	UUCGGCAC	AGAA	GUGACA	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	UGUCACA	GAU	GUGCCGAA
1730	UCUCCUUC	AGAA	GGCAUC	ACCAGAGAAACACACGUGUGUGGUACAUAUACCUGGUA	GAUGCCA	GCC	GAAGGAGA

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1753	CCACACAG AGAA GUUUC	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	UGAAACU GUC CUGUGUGG
2017	GGUUUUGA AGAA GGUGUG	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	CACACCU GCU UCAAAACC
2101	ACCAAGUG AGAA GAGGCG	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	CGCCUCA GAU CACUUGGU
2176	UUUCAUAU AGAA GCGUGC	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	GCACGCU GUU UAUUGAAA
5 2258	GUGAGGUA AGAA GCGCUU	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	AAGCGCA GCC UACCUCAC
2305	UGAGCGUG AGAA GCUCCA	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	UGGAGCU GAU CACGCUCA
2383	CGGAAGAA AGAA GCUUCA	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	UGAAGCG GUC UUCUUCGG
2405	GACAGGUA AGAA GUCUUU	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	AAAGACA GAC UACCUGUC
2432	GGAAUUC AGAA GGGUCC	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	GGACCCA GAU GAAGUUCC
10 2464	CAUAGGGC AGAA GUUCAC	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	GUGAACG GCU GCCCUAUG
2467	CAUCAUAG AGAA GCCGUU	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	AACGGCU GCC CUAUGAUG
2592	CACAGUCC AGAA GGUGGG	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	CCCACCU GCC GGACUGUG
2596	CAGCCACA AGAA GGCAGG	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	CCUGCCG GAC UGUGGCUG
2653	GUUCGGUC AGAA GAGCUU	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	AAGCUCU GAU GACCGAAC
15 2743	CGAUCACC AGAA GAGGCC	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	GGCCUCU GAU GGUGAUCG
2779	GGUAGUUG AGAA GGUUUC	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	GAAACCU GUC CAACUACC
2814	CUUGUUUGA AGAA GAAUAA	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	UUUUUCU GUC UCAACAAG
2831	AUUGCAA AGAA GCGUCC	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	GGACGCA GCC UUGCAUUA
2895	ACUGUCUA AGAA GGGCUU	ACCAGAGAAACACACG	UUGUGGUACAUUACCUGGUA	AAGCCCC GCC UAGACAGU

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2913	GACACUUG	AGAA	GCUGAC	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	GUCAGCA	GCU	CAAGUGUC
2928	GAAGCUGG	AGAA	GGUGAC	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	GUCACCA	GCU	CCAGCUUC
2934	UUCAGGGA	AGAA	GGAGCU	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	AGCUCCA	GCU	UCCCUCAA
3001	UGGUGAGG	AGAA	GCUUGG	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	CCAAGCA	GCC	CCUCACCA
5 3022	UGUAGGAA	AGAA	GGUCUU	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	AAGACCU	GAU	UUCCUACA
3033	CACUUGGA	AGAA	GUAGGA	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	UCCUACA	GUU	UCCAAGUG
3064	UUCUGGAG	AGAA	GAAACU	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	AGUUUCU	GUC	CUCCAGAA
3179	CUCACAUU	AGAA	GGGUUC	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	GAACCCU	GAU	UAUGUGAG
3357	CUUCAGGC	AGAA	GCAGAA	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	UUCUGCA	GCC	GCCUGAAG
10 3360	UUCCUUCU	AGAA	GCUGCA	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	UGCAGCC	GCC	UGAAGGAA
3379	GGUUCUC	AGAA	GCAUGC	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	GCAUGCG	GAU	GAGAACCC
3463	GUUCAGCA	AGAA	GGGGCC	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	GGCCCCG	GUU	UGCUGAAC
3496	UGGCUUGA	AGAA	GGUCAC	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	GUGACCU	GCU	UCAAGCCA
3553	UGUUUCUA	AGAA	GUAUGG	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	CCAUAUC	GAC	UAGAAACA
15 3615	AUCUGCAA	AGAA	GUCCUU	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	AAGGACG	GCU	UUGCAGAU
3623	AAUUGUGG	AGAA	GCAAAG	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	CUUUGCA	GAU	CCACAUUU
3650	CUCACAUC	AGAA	GAGCUU	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	AAGCUCU	GAU	GAUGUGAG
3754	UAGUGUCC	AGAA	GAUAGU	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	ACUAUCA	GCU	GGACACUA
3772	GGGAGCCC	AGAA	GAGUGC	ACCAGAGAAACACACG	UUGUGGUACA	UUACCUGGUA	GCACUCU	GCU	GGGCUCCC

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3796	UCCAGGUG	AGAA	GCUUCA	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	UGAAGCG	GUU	CACCUGGA
3881	CUCGGCAG	AGAA	GAAAGU	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	ACUUUCC	GAU	CUGCCGAG
3886	UGGGCCUC	AGAA	GAUCGG	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	CCGAUCU	GCC	GAGGCCCA
3897	GAAGCAGA	AGAA	GGGCCU	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	AGGCCCA	GCU	UCUGCUUC
3903	GCUGGAGA	AGAA	GAAGCU	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	AGCUUCU	GCU	UCUCCAGC
3912	GUGGCCAC	AGAA	GGAGAA	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	UUUCUCCA	GCU	GUGGCCAC
3969	UGGAGAAC	AGAA	GGACUC	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	GAGUCCU	GCU	GUUCUCCA
3972	GGGUGGAG	AGAA	GCAGGA	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	UCCUGCU	GUU	CUCCACCC
3986	GAGUUUGA	AGAA	GGGGGU	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	ACCCCCA	GAC	UACAACUC
4018	UUUAGGCG	AGAA	GGGAGG	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	CCUCCCC	GCC	CGCCUAAA
4022	AAGCUUUA	AGAA	GGCGGG	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	CCCGCCC	GCC	UAAAGCUU
4040	GUUGUCGG	AGAA	GGUGAG	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	CUCACCA	GCC	CCGACAAC
4053	CUGUCAGG	AGAA	GGUUGU	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	ACAACCA	GCC	CCUGACAG
4095	UCCUGUGG	AGAA	GAAUAG	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	CUAUUCC	GCU	CCACAGGA
4110	CGAAAAGC	AGAA	GGCUCC	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	GGAGCCA	GCU	GCUUUUCG
4113	UCACGAAA	AGAA	GCUGGC	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	GCCAGCU	GCU	UUUCGUGA
4168	UUAGUCA	AGAA	GCAACA	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	UGUUGCU	GUU	UUGACUAA
4290	GGUGGGCG	AGAA	GUCGCC	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	GGCGACC	GCC	CGCCCCACC
4294	GGCCGGUG	AGAA	GGCGGU	ACCAGAGAAAACACACG	UUGUGGUACA	UAUACCUGGUA	ACCGCCC	GCC	CACCGGCC

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4329	AGUCCAC AGAA GCAGG ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	CCCUGCA GCU GUGGGACU
4378	CAGAGCAG AGAA GUGCAU ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	AUGCACU GAC CUGCUCUG
4383	AGAGACAG AGAA GGUCAG ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	CUGACCU GCU CUGCUCU
4388	AUAAGAGA AGAA GAGCAG ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	CUGCUCU GUC UCUCUUAU
5 4457	CUCCACAG AGAA GACGCA ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	UGCGUCC GUC CUGUGGAG
4525	CCCGAAAC AGAA GAGGCC ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	GGCCUCC GCU GUUUCGGG
4528	GGGCCCGA AGAA GCGGAG ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	CUCCGCU GUU UCGGGCCC
4643	AAACAGAC AGAA GAAGAC ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	GUCUUCU GUU GUCUGUUU
4650	GGUUGGUA AGAA GACAAC ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	GUUGUCU GUU UACCAUCC
10 4724	ACUAGAGG AGAA GAUGAU ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	AUCAUCA GUU CCUCUAGU
4771	AUGCGAAG AGAA GGCCUG ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	CAGGCCU GAC CUUCGCAU
4785	UCCCCGUG AGAA GUAUGC ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	GCAUACU GCU CACGGGGA
4809	CUAGGCCA AGAA GGACCA ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	UGGUCCA GUU UGGCCUAG
4834	UUAGGCCC AGAA GUAGGC ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	GCCUACU GAU GGGCUCAA
15 4912	AUAUAUAA AGAA GGAUAA ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	UUAUCCU GUU UUAUAUUA
5119	UCCUCUCA AGAA GCCUUG ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	CAAGGCA GUC UGAGAGGA
5144	UAAUAUUG AGAA GAUACU ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	AGUAUCA GCC CAUAUUAU
5287	AGGUAUGA AGAA GAUGAA ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	UUCAUCU GUU UCAUACCU
5363	CCCCAAG AGAA GGCACC ACCAGAGAAACACACGUUGUGGUACAUAUACCUUGGUA	GGUGCCC GCU CUUUGGGG

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5462	CCGGCUCC	AGAA	GGUGUG	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	CACACCU	GCC	GGAGCCGG
5478	GUCUGCCC	AGAA	GUGACC	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	GGUCACA	GCU	GGGCAGAC
5486	UAUUCAUC	AGAA	GCCCAG	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	CUGGGCA	GAC	GAUGAAUA
5500	UCUCCCCA	AGAA	GCUAUU	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	AAUAGCU	GCU	UUGGGAGA
5 5539	CUGGCCCG	AGAA	GAGAAU	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	AUUCUCU	GAC	CGGGCCAG
5564	CACAGGGG	AGAA	GGUACC	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	GGUACCU	GCU	CCCCUGUG
5597	UCUCAUCA	AGAA	GAAAC	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	GUUUUCU	GUC	UGAUGAGA
5601	CCAGUCUC	AGAA	GACAGA	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	UCUGUCU	GAU	GAGACUGG
5639	GGGCUGCA	AGAA	GUCUCA	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	UGAGACA	GCC	UGCAGCCC
10 5646	CCACAGUG	AGAA	GCAGGC	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	GCCUGCA	GCC	CACUGUGG
5781	CACACUGC	AGAA	GACAAG	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	CUUGUCG	GCU	GCAGUGUG
5829	CUGUUCUC	AGAA	GUUUUCU	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	AGAAACG	GAU	GAGAACACAG
5842	AAACCUCA	AGAA	GCUGUU	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	AACAGCA	GCC	UGAGGUUU
5915	UUUUUAAA	AGAA	GAAUAA	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	UUUUUCC	GAU	UUUAAUAA
15 6010	AGUCUUUA	AGAA	GAACCA	ACCAGAGAAA	CACACG	UUUGGU	ACAUUACC	UGGUA	UGGUTUCU	GCU	UAAAGACU

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Table X: Homologous Hammerhead Ribozyme Target Sites  
Between Human flt-1 and KDR RNA

	nt. Posi- tion	flt-1 Target Sequence		nt. Posi- tion	KDR Target Sequence
5	3388	CCGGGAU A UUUAUAA		3151	CCGGGAU A UUUAUAA
	2174	AAUGUAU A CACAGGG		3069	AgUGUAU c CACAGGG
	2990	UGCAAAU A UGGAAAU		2756	UGCAAAU u UGGAAAc
	2693	CUCCCUU A UGAUGCC		2459	CUgCCUU A UGAUGCC
10	2981	GUUGAAU A CUGCAA		2747	GUgGAAU u CUGCAA
	1359	UAUGGUU A AAAGAUG		2097	UgUGGUU u AAAGAUa
	3390	GGGAUUAU U UAUAAGA		3153	GGGAUUAU U UAUAaag
	3391	GGAUAUU U AUAAGAA		3154	GGAUAUU U AUAaagA
	2925	ACGUGGU U AACCUGC		2691	AuGUGGU c AACCUuC
15	7140	UAUUUCU A GUCAUGA		2340	UAcUUCU u GUCAUcA
	1785	CAAUAAU A GAAGGAA		1515	CucUAAU u GAAGGAA
	2731	GAGACUU A AACUGGG		768	uuGACUU c AACUGGG
	3974	GAUGACU A CCAGGGC		1466	GAgGACU u CCAGGGa
	6590	UUA AUGU A GAAAGAA		2603	aaAAUGU u GAAAGAA
20	6705	GCCAUUU A UGACAAA		3227	aCaAUUU u UGACAgA
	974	GUCAAAU U ACUUAGA		147	uUCAAAU U ACUUGcA
	1872	AUAAAGU U GGGACUG		1602	AcAAAGU c GGGAgag
	2333	ACUUGGU U UAAAAAC		1088	AaaUGGU a UAAAAAu
	2775	AAGUGGU U CAAGCAU		1745	AcaUGGU a CAAGCuU
25	3533	UUCUCCU U AGGUGGG		3296	UUuUCCU U AGGUGcu
	3534	UCUCCUU A GGUGGGU		3297	UuUCCUU A GGUGcuU
	3625	GUACUCU A CUCCUGA		4054	GagCUCU c CUCCUGu
	1814	AGCACCU U GGUUGUG		1059	AGuACCU U GGUUacc
	2744	GGCAAAU C ACUUGGA		147	uuCAAAU u ACUUGcA
30	2783	CAAGCAU C AGCAUUU		796	gAAGCAU C AGCAUaa

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	3613	GAGAGCU C CUGAGUA	2968	GgaAGCU C CUGAaga
	4052	AAGGCCU C GCUCAAG	1923	ucuGCCU u GCUCAAG
	5305	UCUCCAU A UCAAAAC	456	ggUCCAU u UCAAAuC
	7158	AUGUAUU U UGUUAUAC	631	gUcUAUU a UGUAcAu
5	1836	CUAGAAU U UCUGGAA	1007	aUgGAAU c UCUGGug
	2565	CUCUCUU C UGGCUCC	2328	uguUCUU C UGGCUaC
	4250	CUGUACU C CACCCCA	3388	uUaUACU a CACCagA
	7124	ACAUGGU U UGGUCCU	3778	cagUGGU a UGGUuCU
	436	AUGGUCU U UGCCUGA	1337	AcGGUCU a UGCCauu
10	2234	GCACCAU A CCUCCUG	1344	augCCAU u CCUCCcc
	2763	GGGCUUU U GGAAAAG	990	uuGCUUU U GGAAguG
	4229	CCAGACU A CAACUCG	767	auuGACU u CAACUgG
	5301	GUUUUCU C CAUAUCA	3307	ugcUUCU C CAUAUCC
	6015	AGAAUGU A UGCCUCU	1917	AcuAUGU c UGCCUug
15	6095	AUUCCCU A GUGAGCC	1438	AUaCCCU u GUGAaga
	6236	UGUUGUU C CUCUUCU	76	UagUGUU u CUCUUGa
	5962	GCUUCCU U UUAUCCA	3099	auaUCCU c UUAUCgg
	7629	UAUAUAU U CUCUGCU	3096	gAaAUAU c CUCUuaU

Lowercase letters are used to represent sequence variance  
 20 between flt-1 and KDR RNA

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Table XI: 2.5  $\mu$ mol RNA Synthesis Cycle

Reagent	Equivalents	Amount	Wait Time*
Phosphoramidites	6.5	163 $\mu$ L	2.5
S-Ethyl Tetrazole	23.8	238 $\mu$ L	2.5
5 Acetic Anhydride	100	233 $\mu$ L	5 sec
N-Methyl Imidazole	186	233 $\mu$ L	5 sec
TCA	83.2	1.73 mL	21 sec
Iodine	8.0	1.18 mL	45 sec
Acetonitrile	NA	6.67 mL	NA

Claims

1. Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.  
5
2. The nucleic acid of claim 1, wherein said receptor is flt-1, KDR and/or flk-1.
3. The nucleic acid of claim 1 or 2, wherein said molecule is an enzymatic nucleic acid molecule.
- 10 4. The nucleic acid molecule of claim 3, wherein, the binding arms of said enzymatic nucleic acid contain sequences complementary to the substrate nucleotide base sequences in any one of Tables II to IX.
5. The nucleic acid molecule of claims 3 or 4,  
15 wherein said nucleic acid molecule is in a hammerhead motif.
6. The enzymatic nucleic acid molecule of claim 3 or 4, wherein said nucleic acid molecule is in a hairpin, hepatitis Delta virus, group I intron, VS nucleic acid or  
20 RNaseP nucleic acid motif.
7. The enzymatic nucleic acid molecule of any of claims 3 or 4, wherein said ribozyme comprises between 12 and 100 bases complementary to the RNA of said region.
8. The enzymatic nucleic acid of claim 7, wherein  
25 said ribozyme comprises between 14 and 24 bases complementary to the RNA of said region.
9. Enzymatic nucleic acid molecule consisting essentially of any ribozyme sequence selected from those shown in Tables II to IX.



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10. A mammalian cell including a nucleic acid molecule of any of claims 1, 2 or 3.

11. The cell of claim 10, wherein said cell is a human cell.

5 12. An expression vector comprising nucleic acid encoding the nucleic acid molecule of any of claims 1, 2, 3 or 4, in a manner which allows expression and/or delivery of that RNA molecule within a mammalian cell.

10 13. The expression vector of claim 12, wherein said nucleic acid is an enzymatic nucleic acid.

14. A mammalian cell including an expression vector of any of claims 12 or 13.

15. The cell of claim 14, wherein said cell is a human cell.

15 16. A method for treatment of a patient having a condition associated with the level of flt-1, KDR and/or flk-1, wherein the patient, tissue donor or population of corresponding cells is administered a therapeutically effective amount of an enzymatic nucleic acid molecule of  
20 claims 1, 2, 3 or 4.

17. A method for treatment of a condition related to the level of flt-1, KDR and/or flk-1 activity by administering to a patient an expression vector of claim 12.

18. The method of claims 16 or 17, wherein said  
25 patient is a human.

19. The nucleic acid of claim 1 or 2, wherein said molecule is an antisense nucleic acid molecule.

20. The nucleic acid molecule of claim 19, wherein, said antisense nucleic acid contain sequences complementary to the substrate nucleotide base sequences in any one of Tables II to IX.

5        21. An expression vector comprising nucleic acid encoding the antisense nucleic acid molecule of any one of claims 19 or 20, in a manner which allows expression and/or delivery of that antisense RNA molecule within a mammalian cell.

10       22. A mammalian cell including an expression vector of claim 21.

23. The cell of claim 22, wherein said cell is a human cell.

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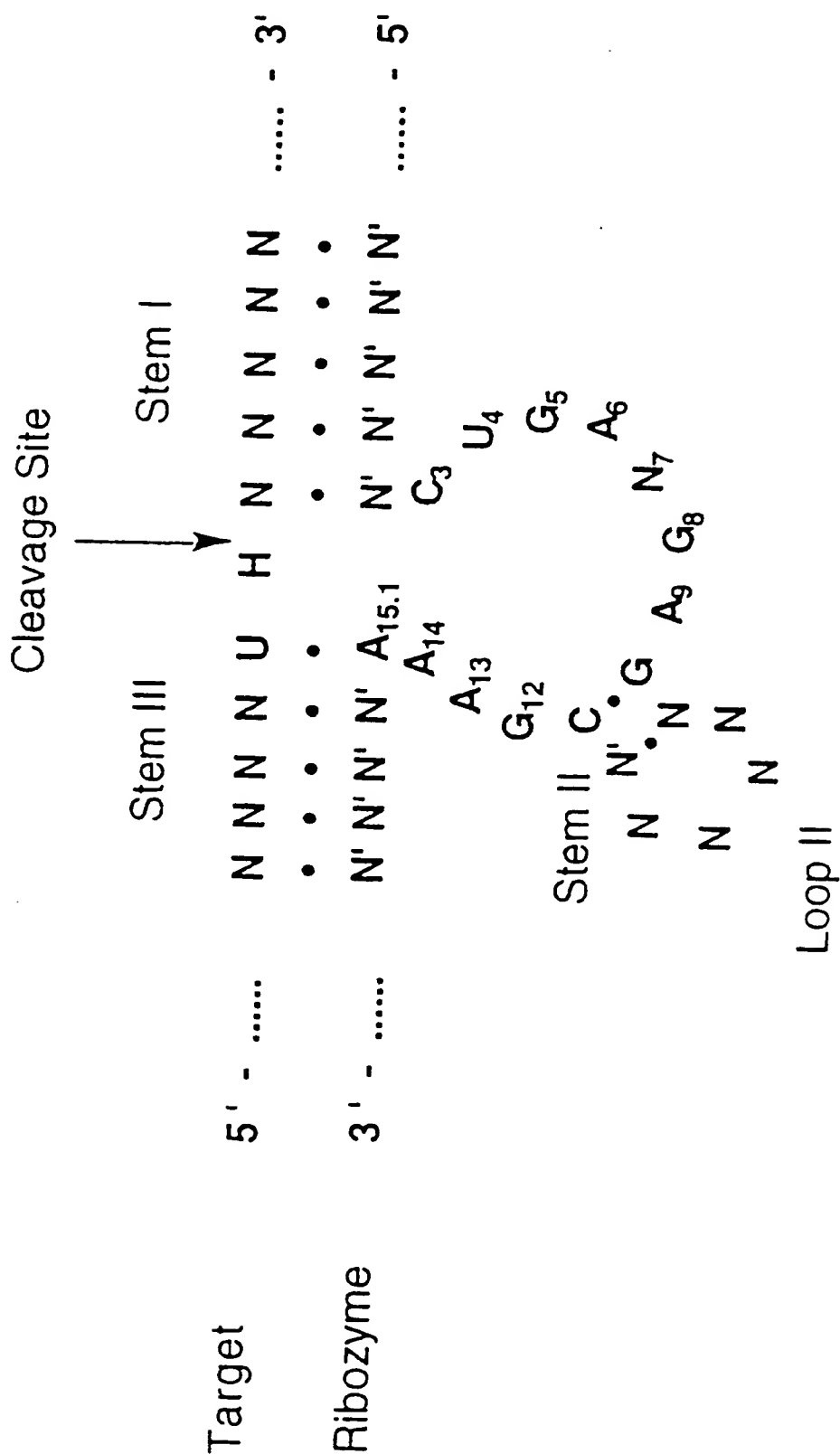


FIG. 1.

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FIG. 2a.

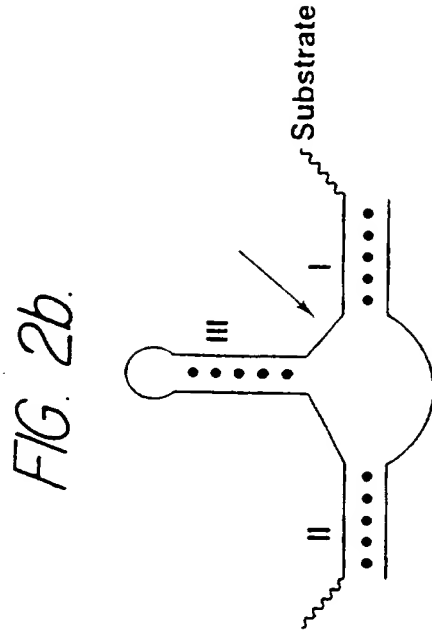
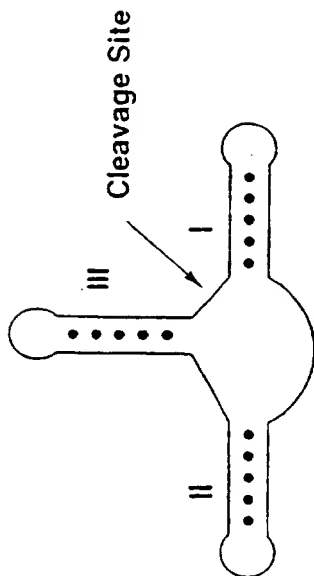


FIG. 2c.

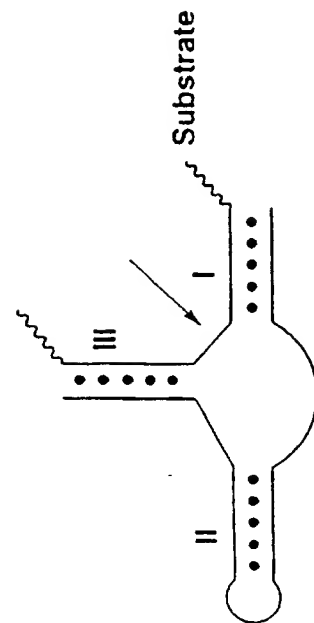
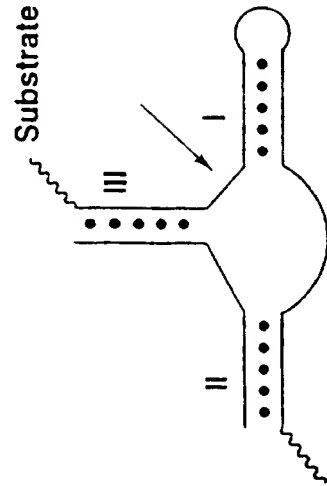


FIG. 2d.



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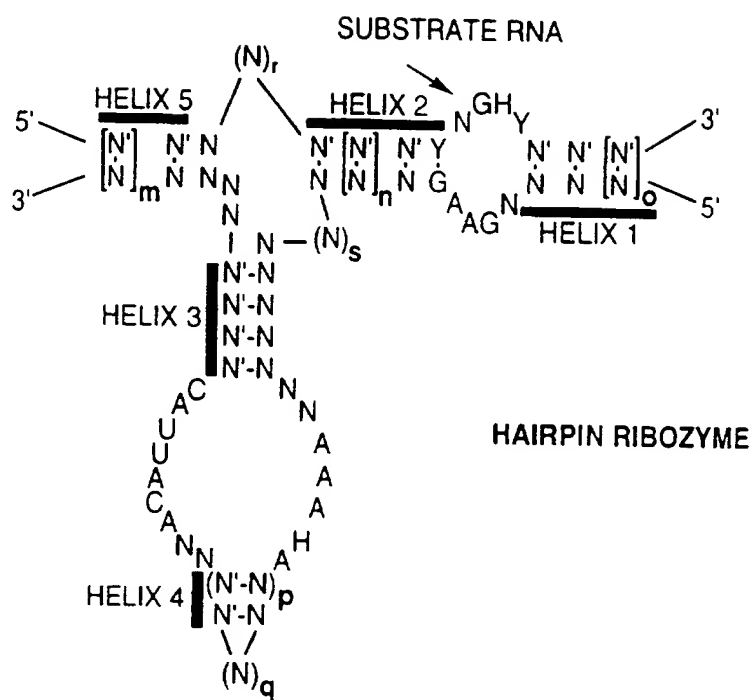


FIG. 3.

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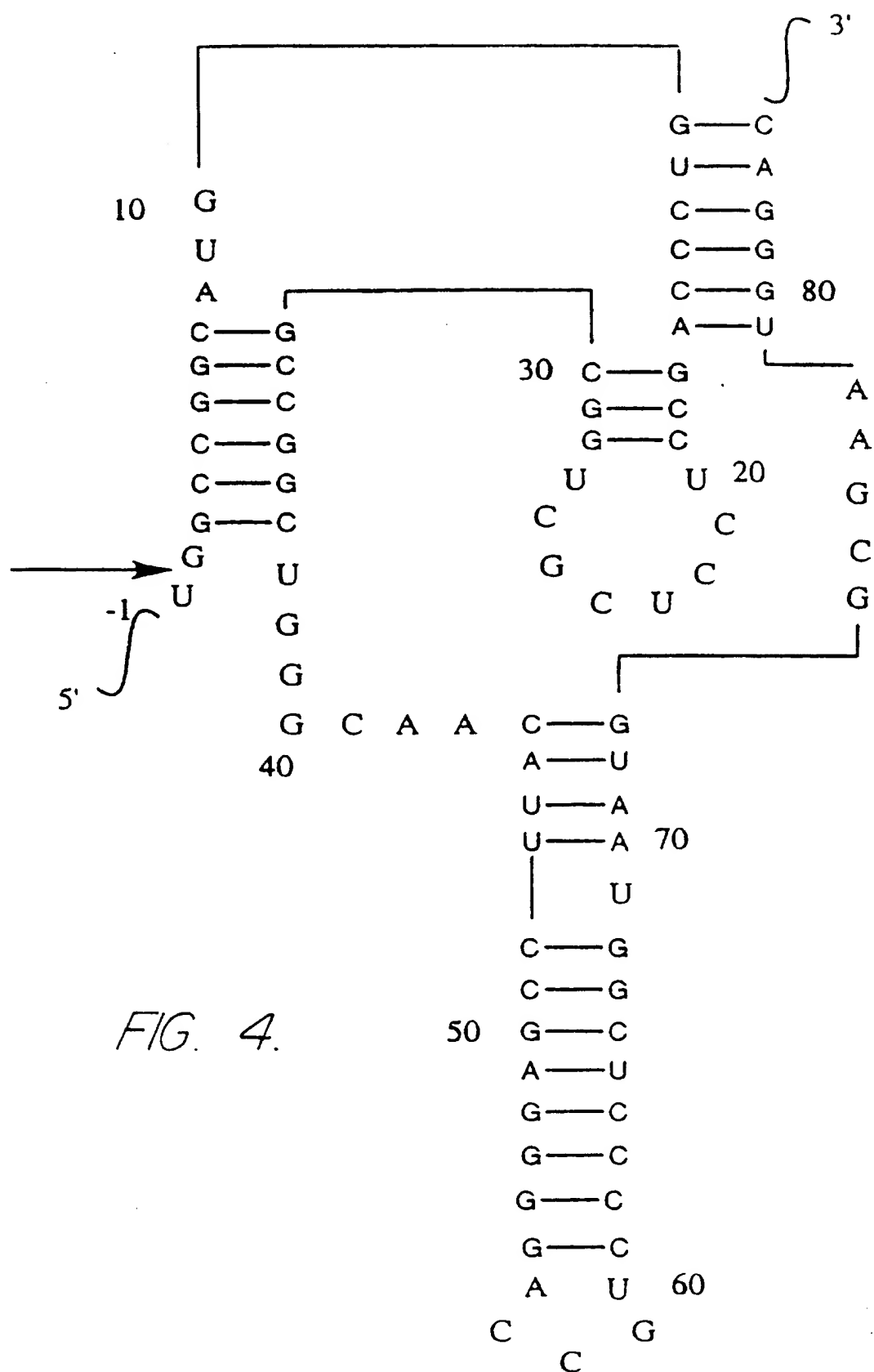


FIG. 4.

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## NEUROSPORA VS RNA ENZYME

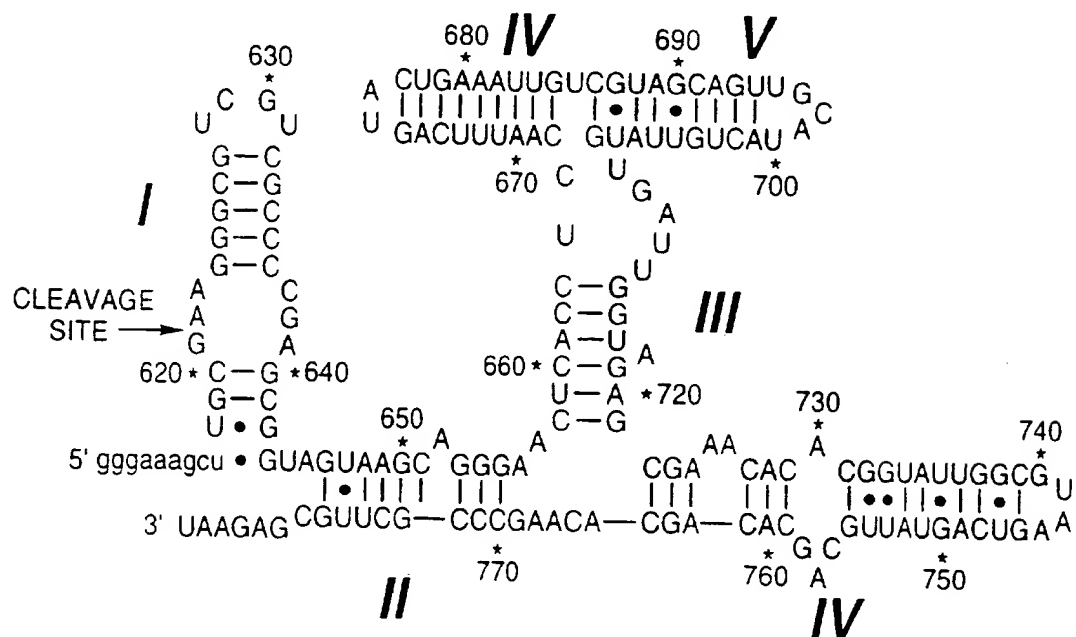
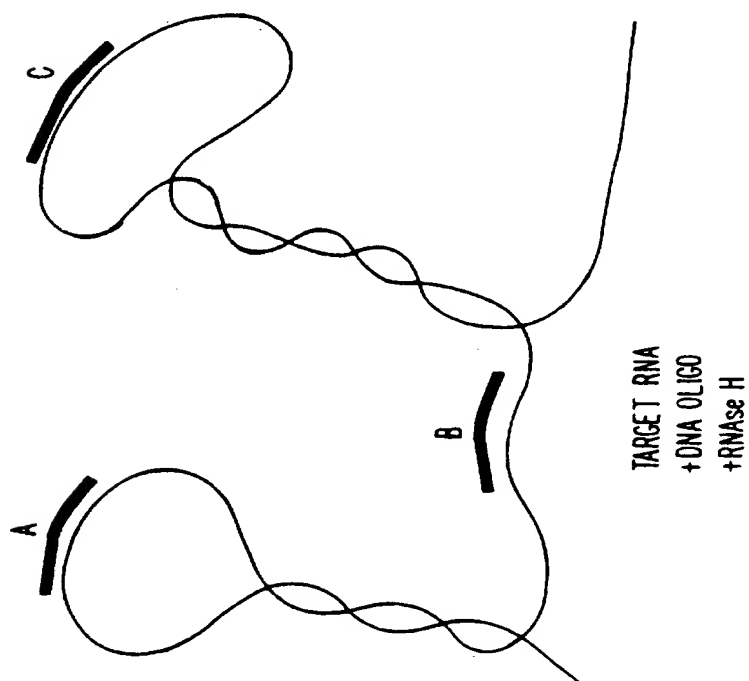
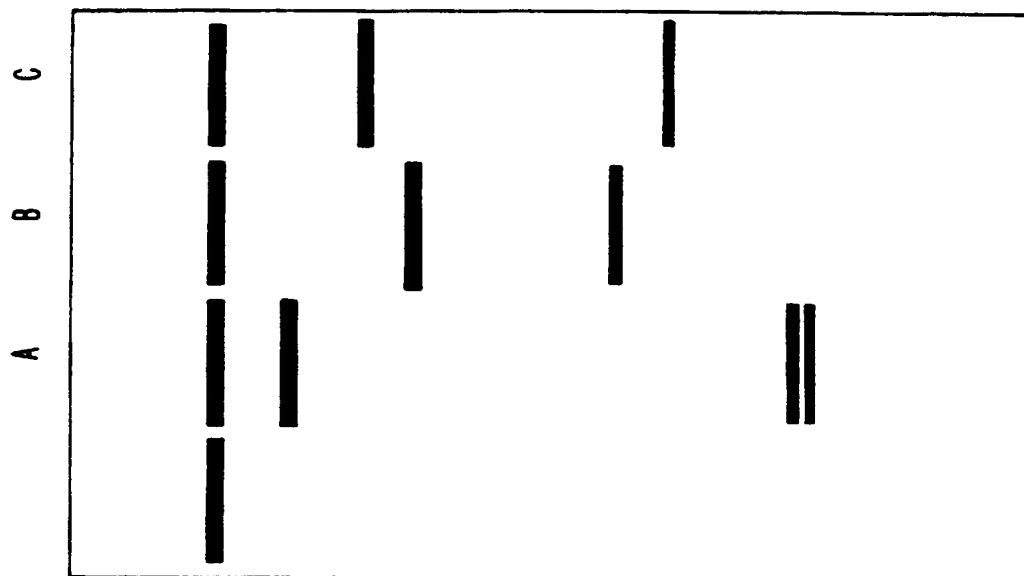


FIG. 5.

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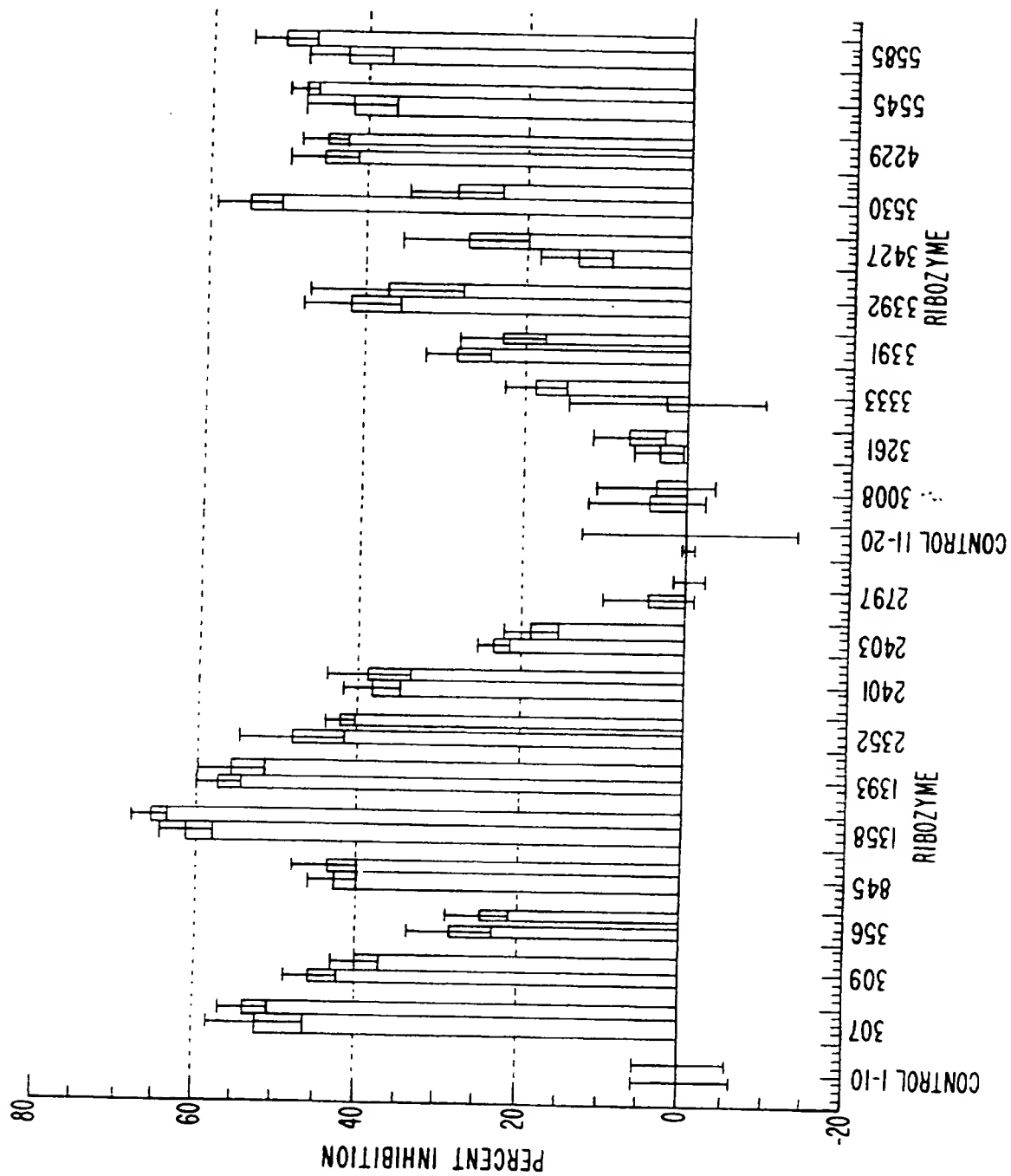
FIG. 6.





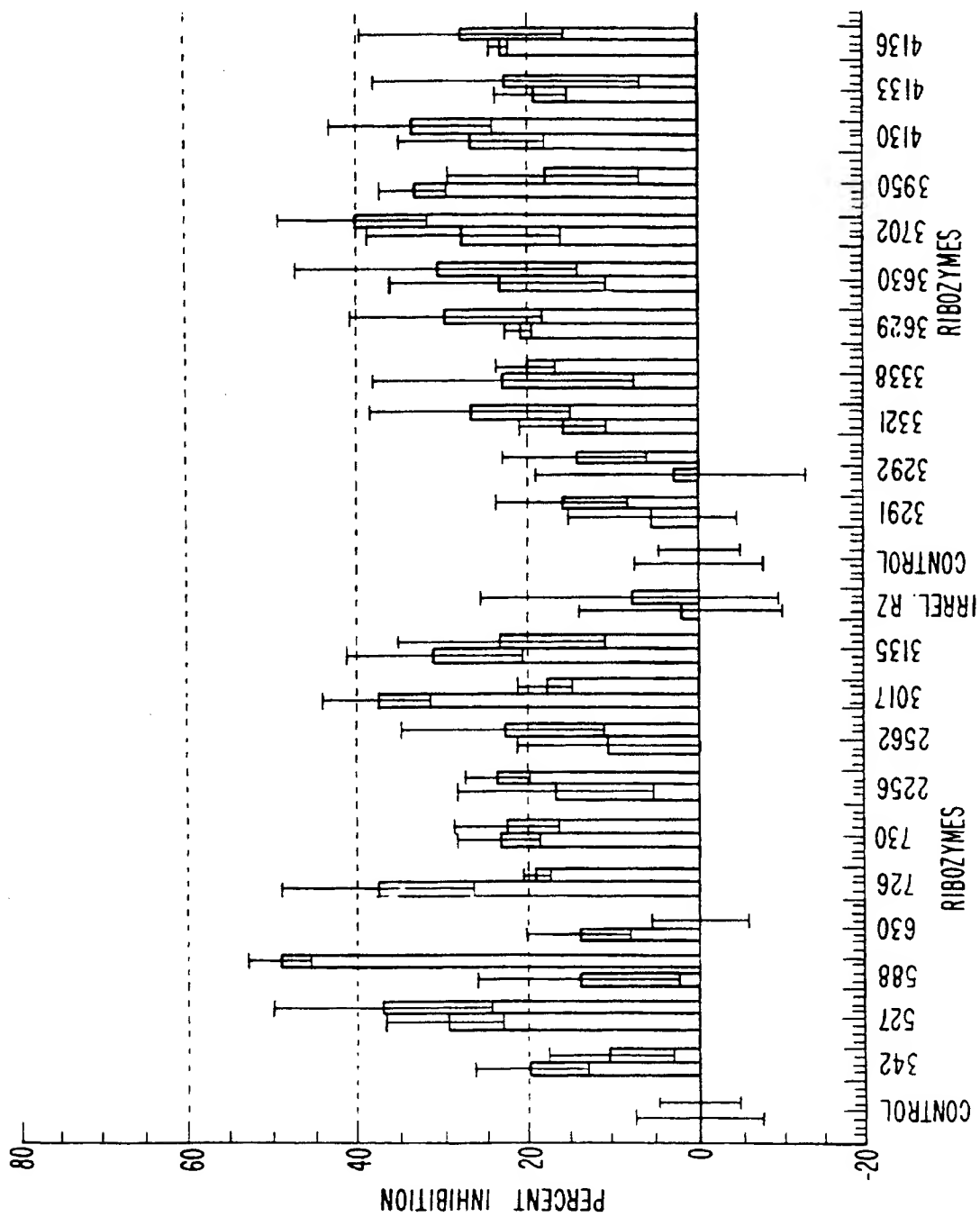
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FIG. 7



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FIG. 8



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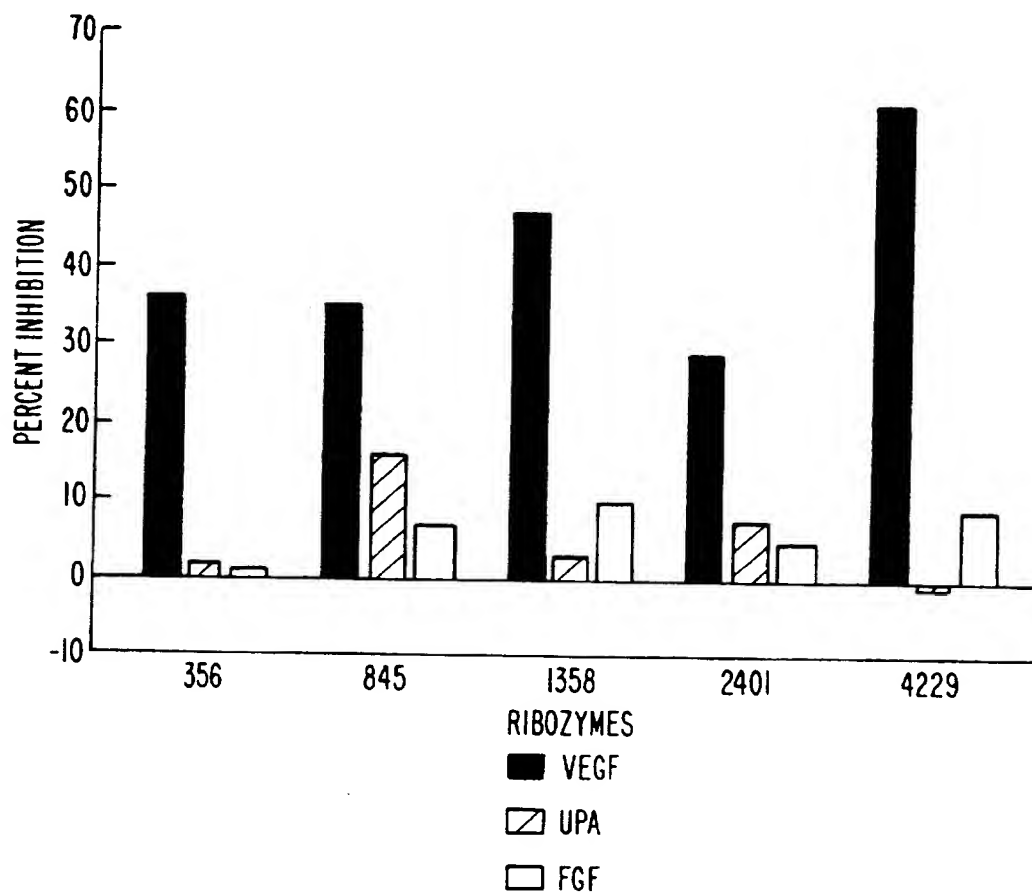
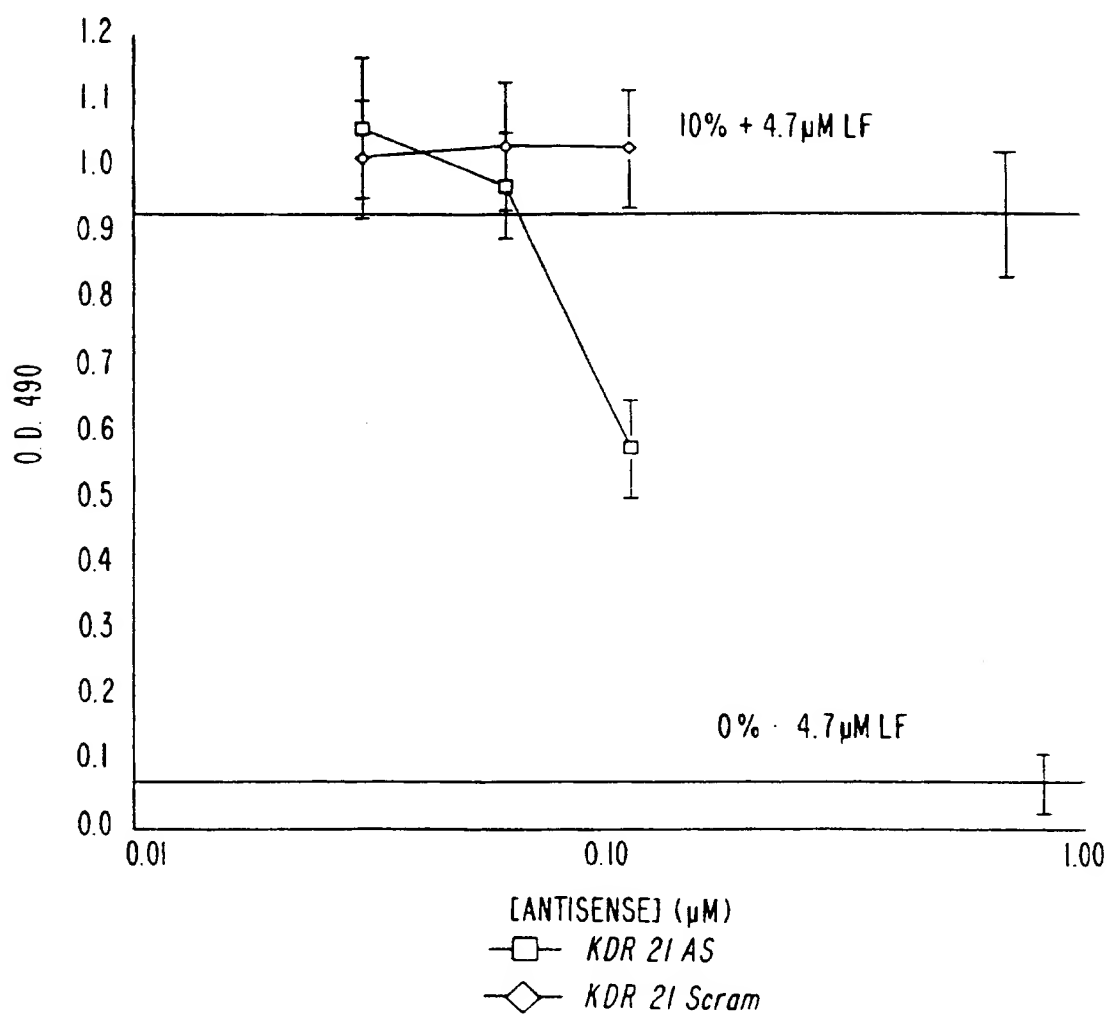


FIG. 9.

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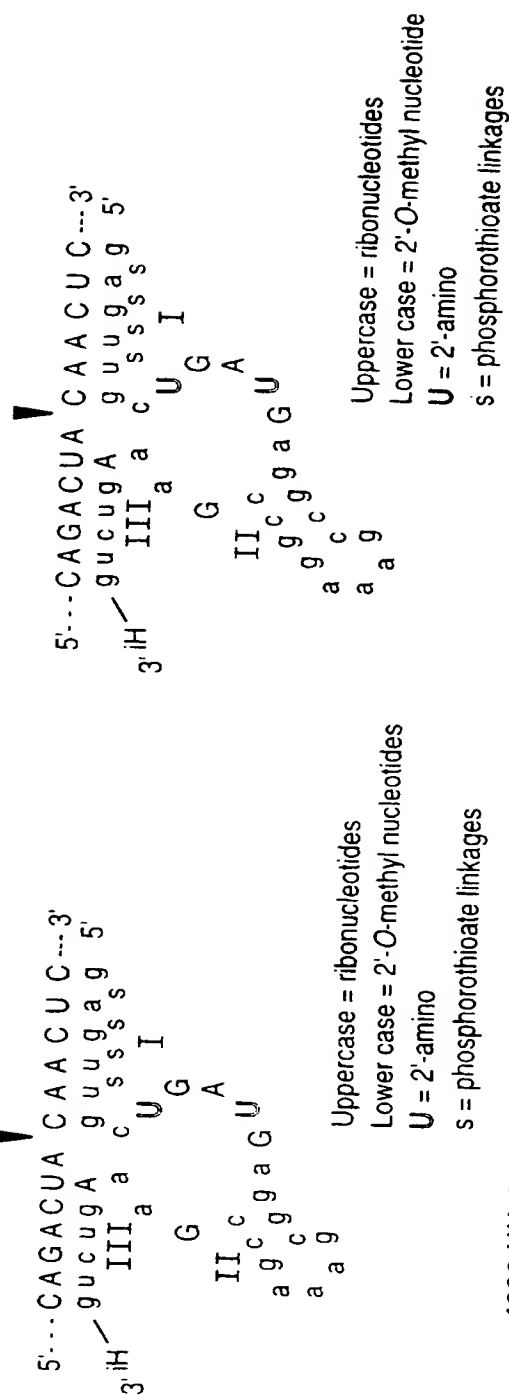
FIG. 10.



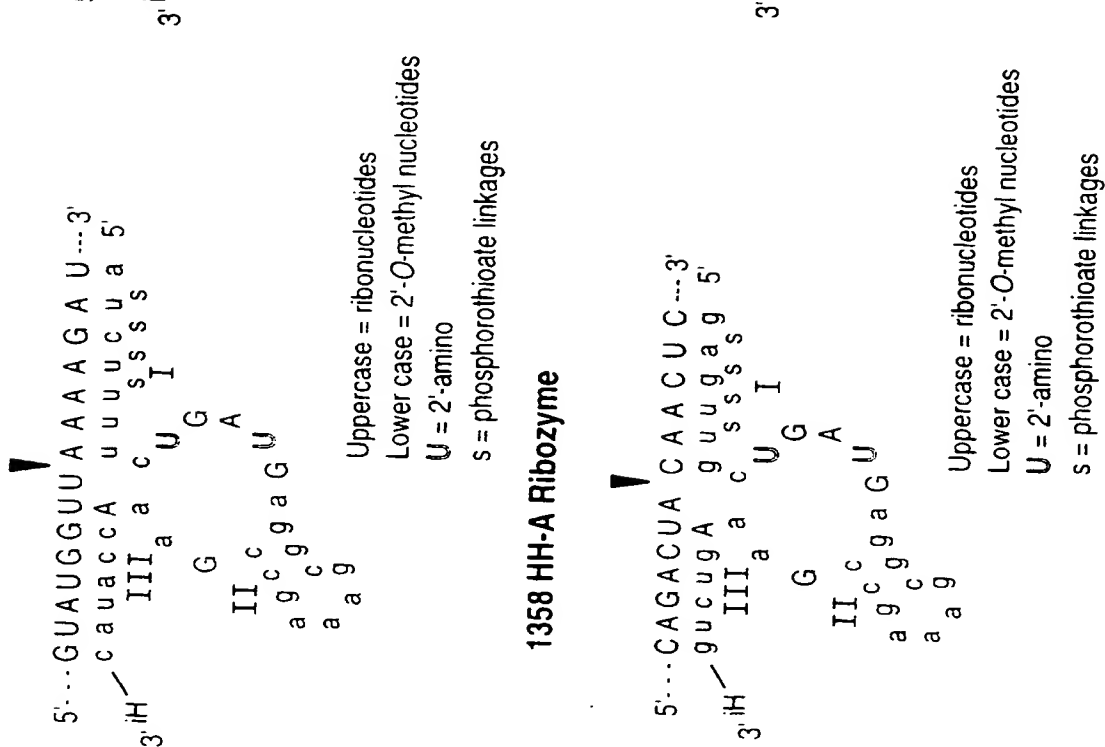
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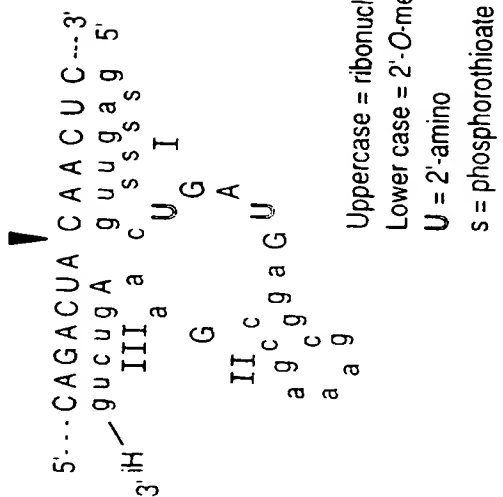
## 1358 HH-B Ribozyme



## 4229 HH-B Ribozyme



## 1358 HH-A Ribozyme



## 4229 HH-A Ribozyme

FIG. 11A.

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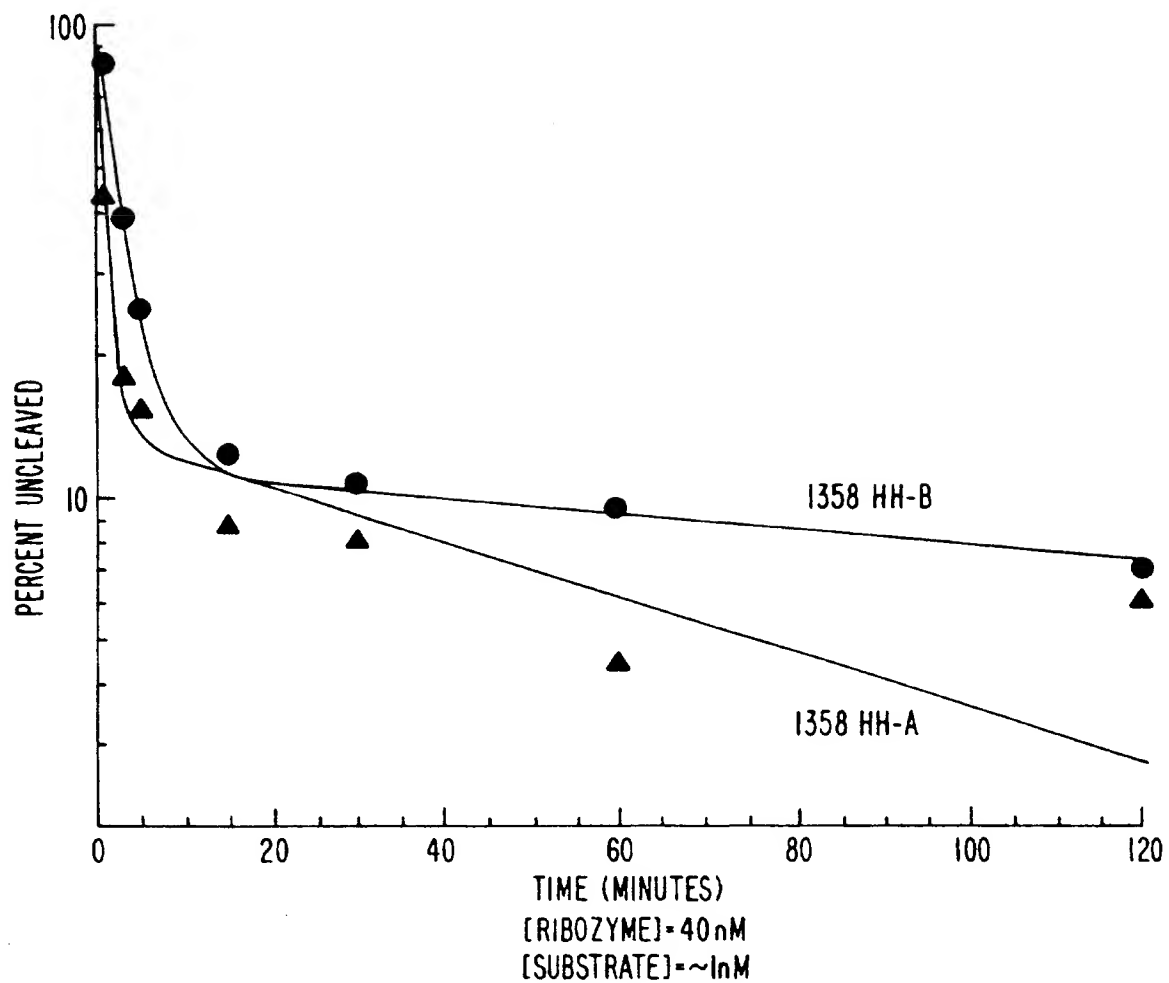
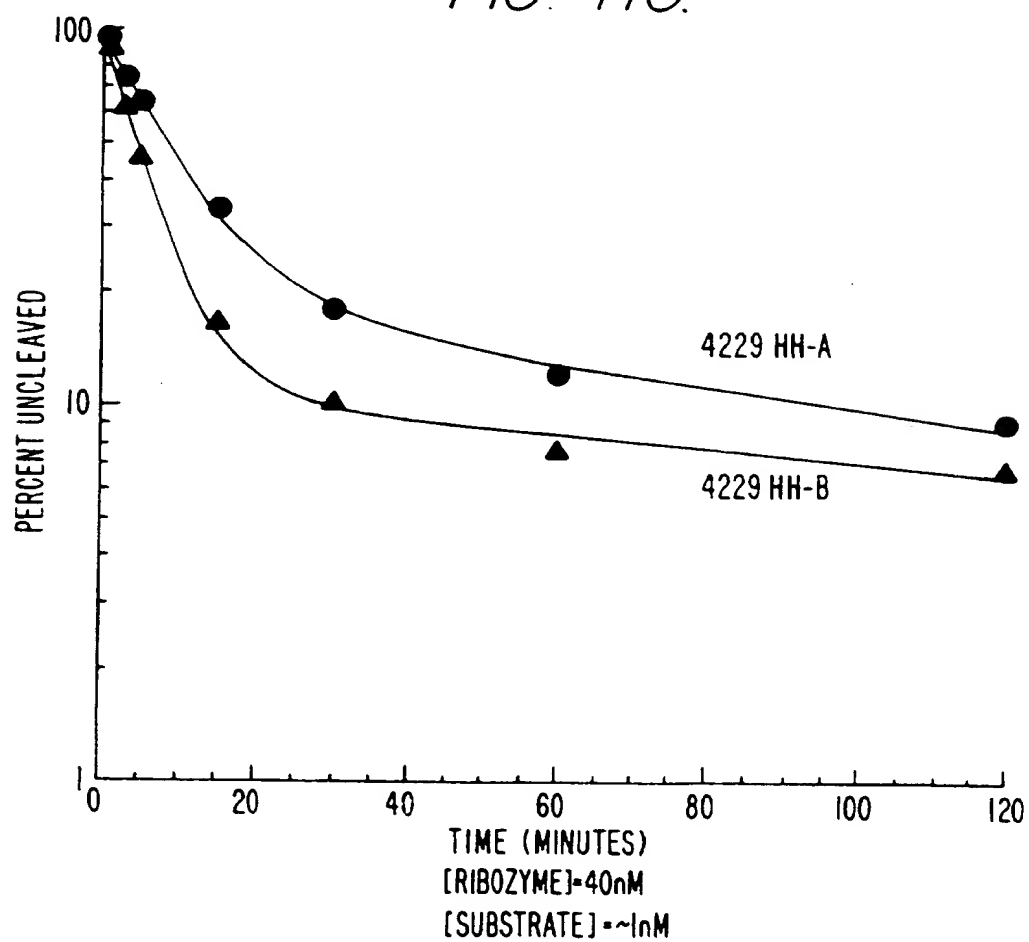


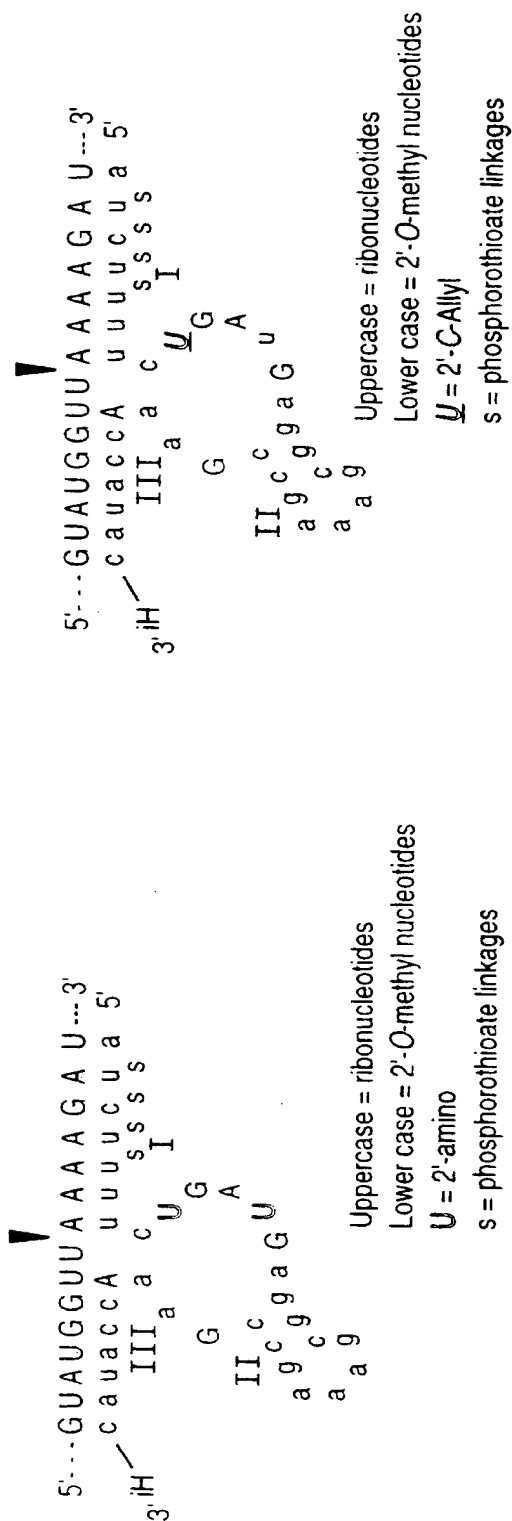
FIG. 11B.

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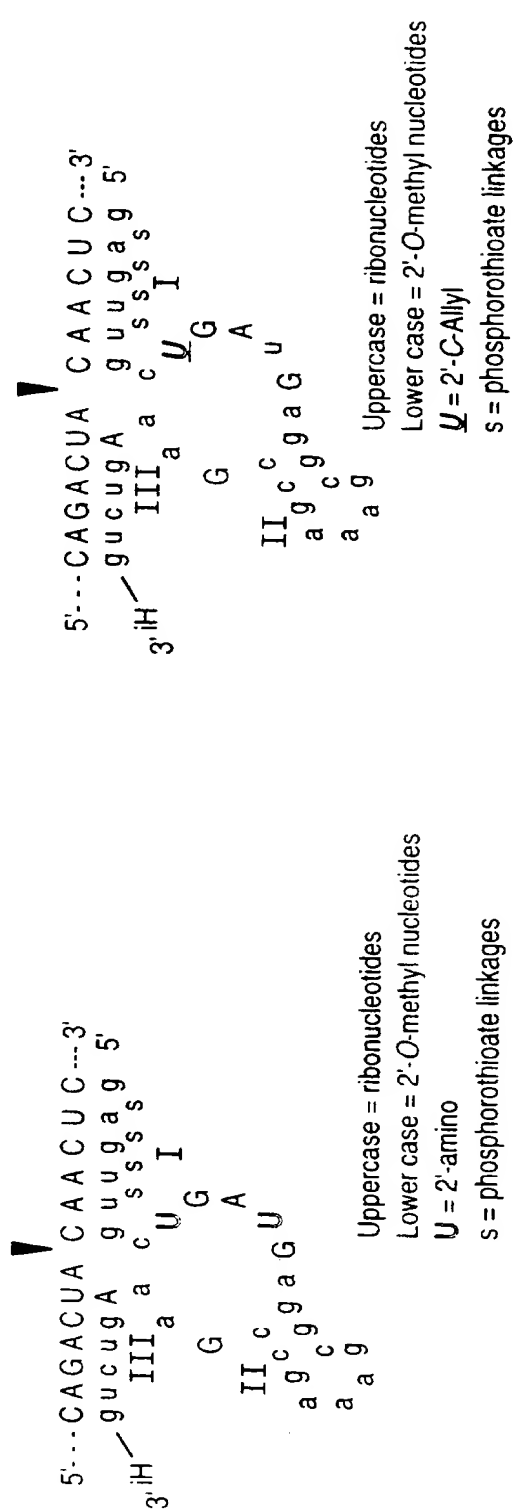
FIG. 11C.



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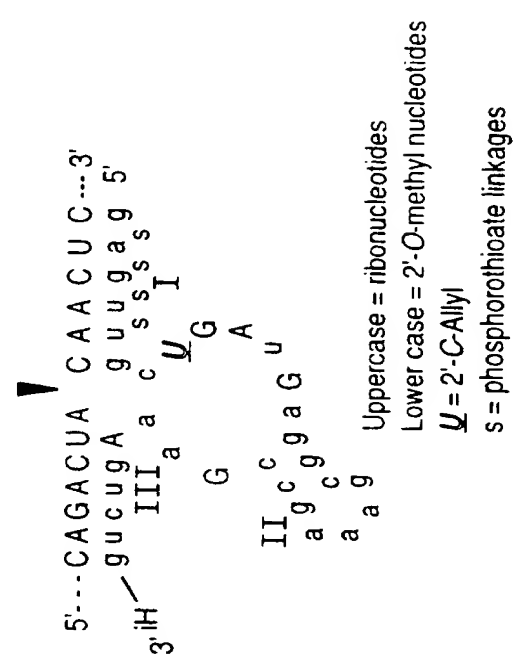


## 1358 HH (2'-Amino ) Ribozyme



## 4229 HH (2'-Amino ) Ribozyme

## 1358 HH (2'-C-Allyl) Ribozyme



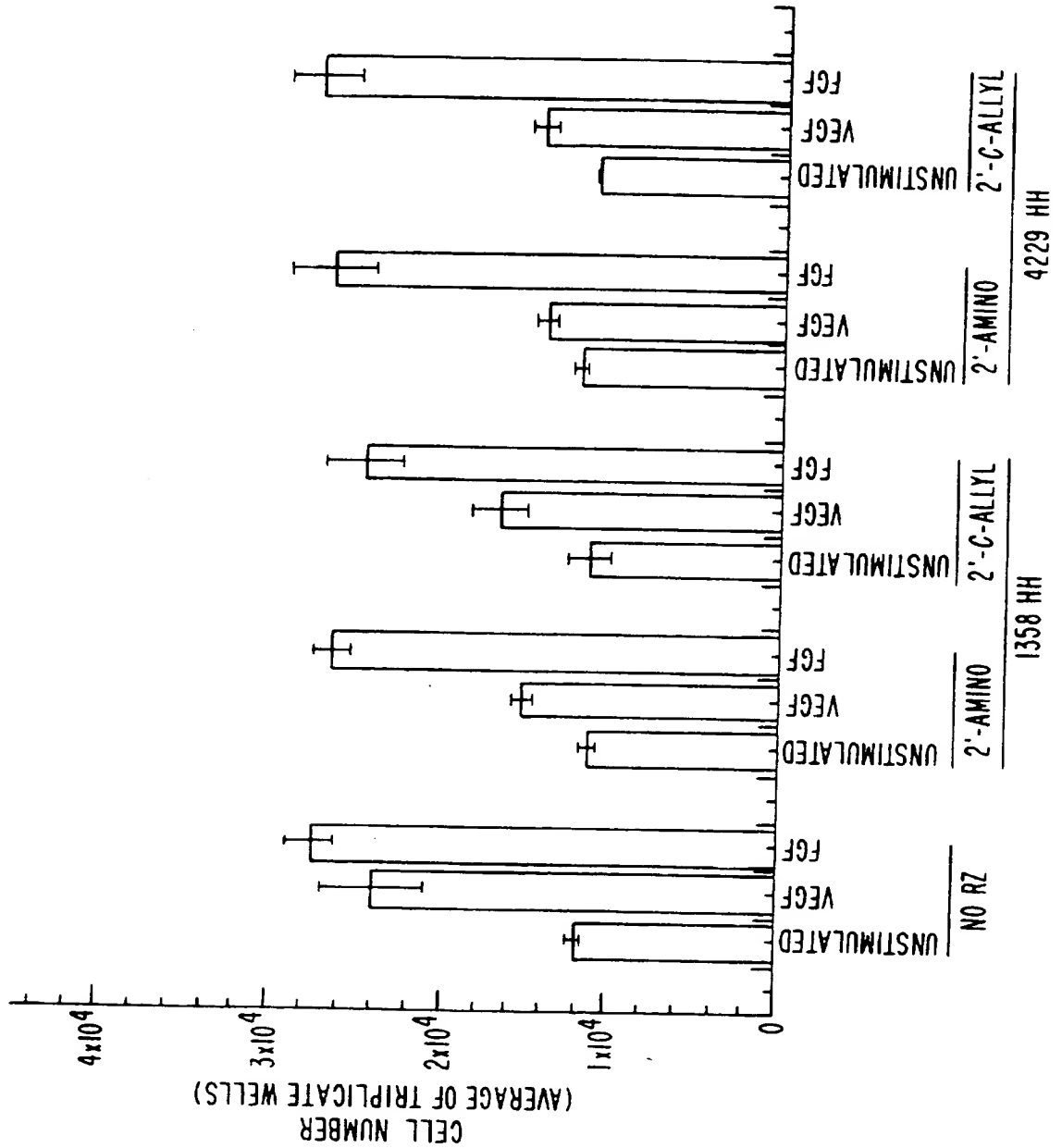
## 4229 HH (2'-C-Allyl) Ribozyme

FIG. 12A.



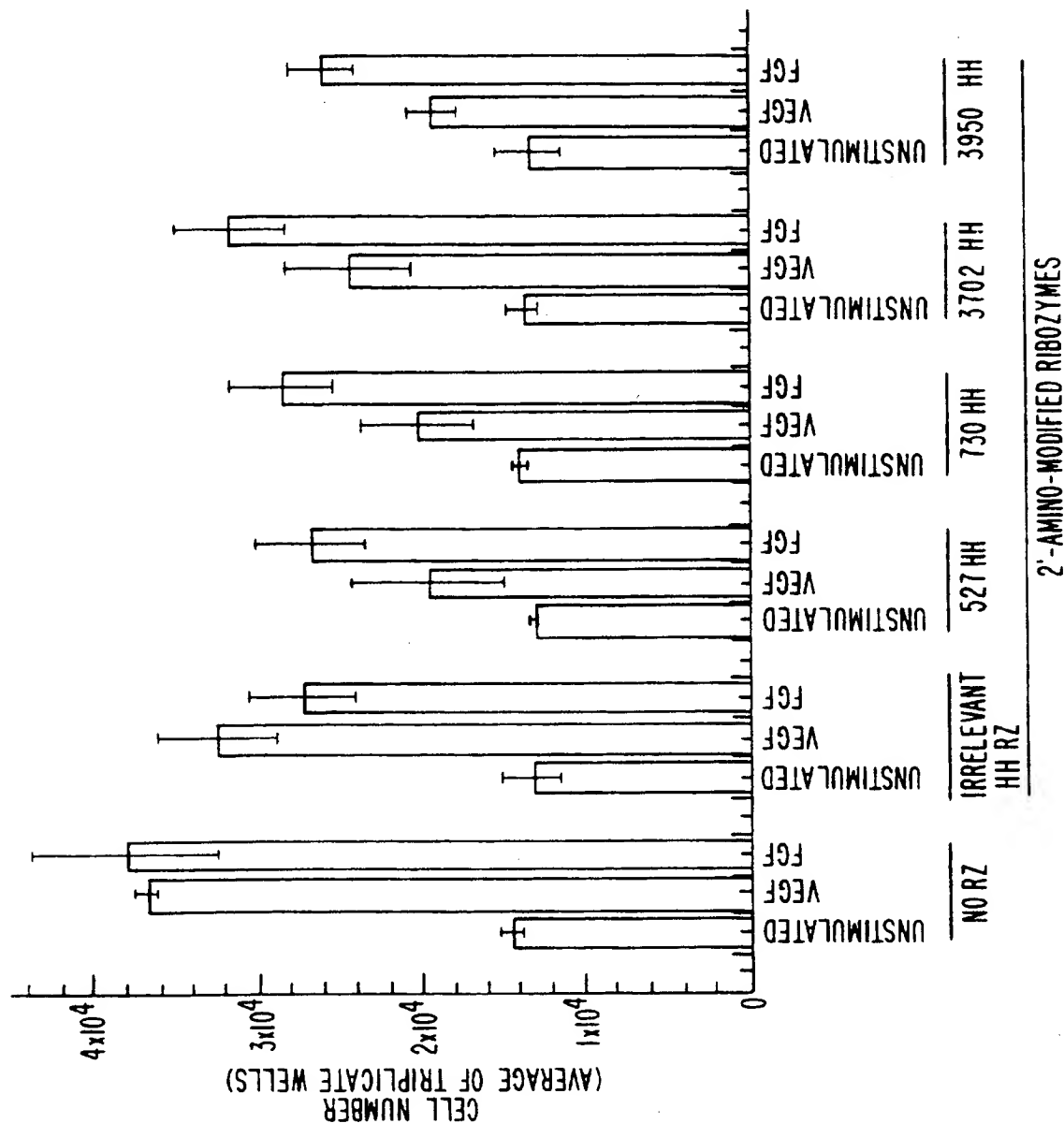
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FIG. 12B.



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FIG. 13.



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FIG. 14.

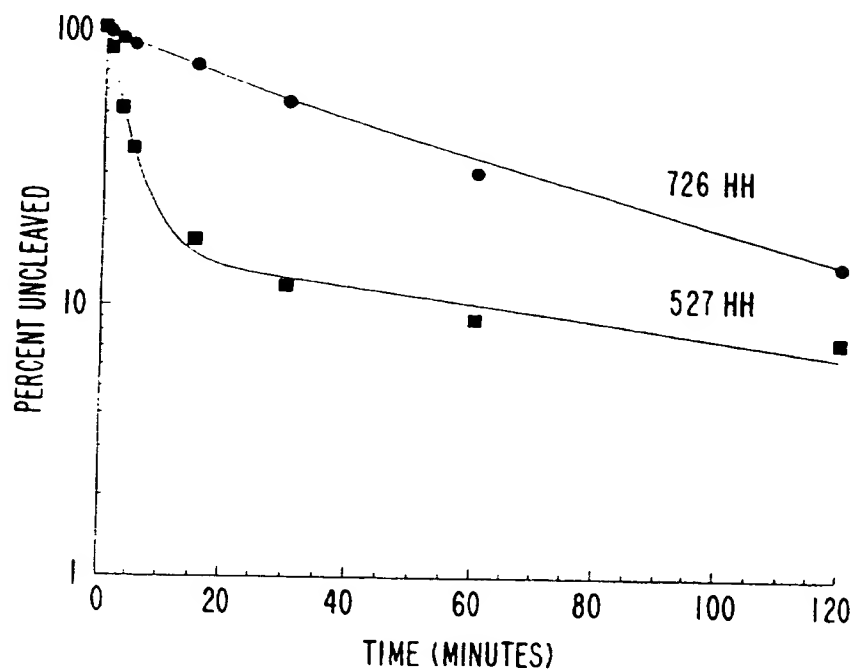
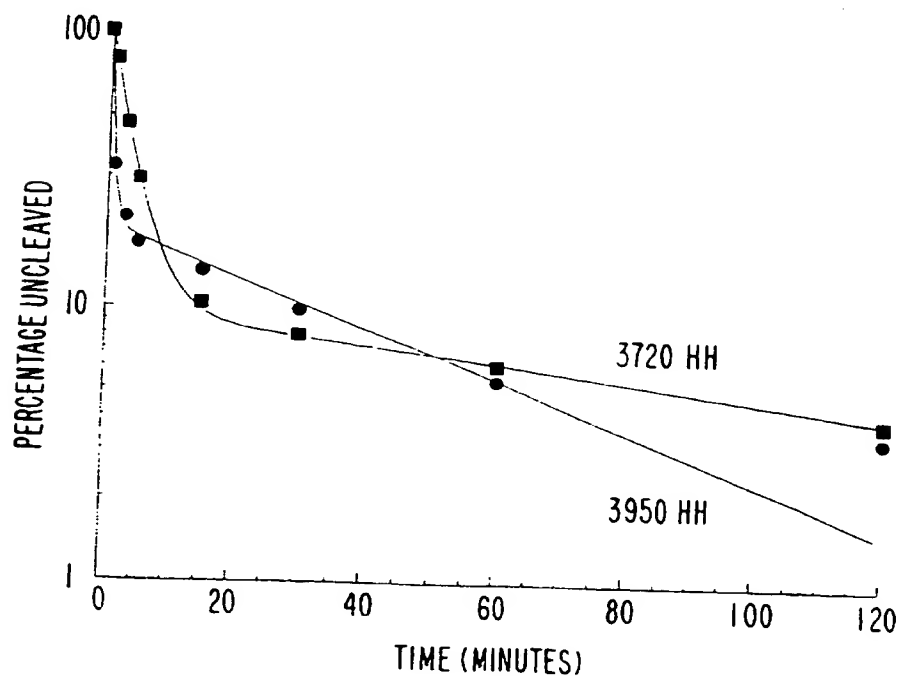


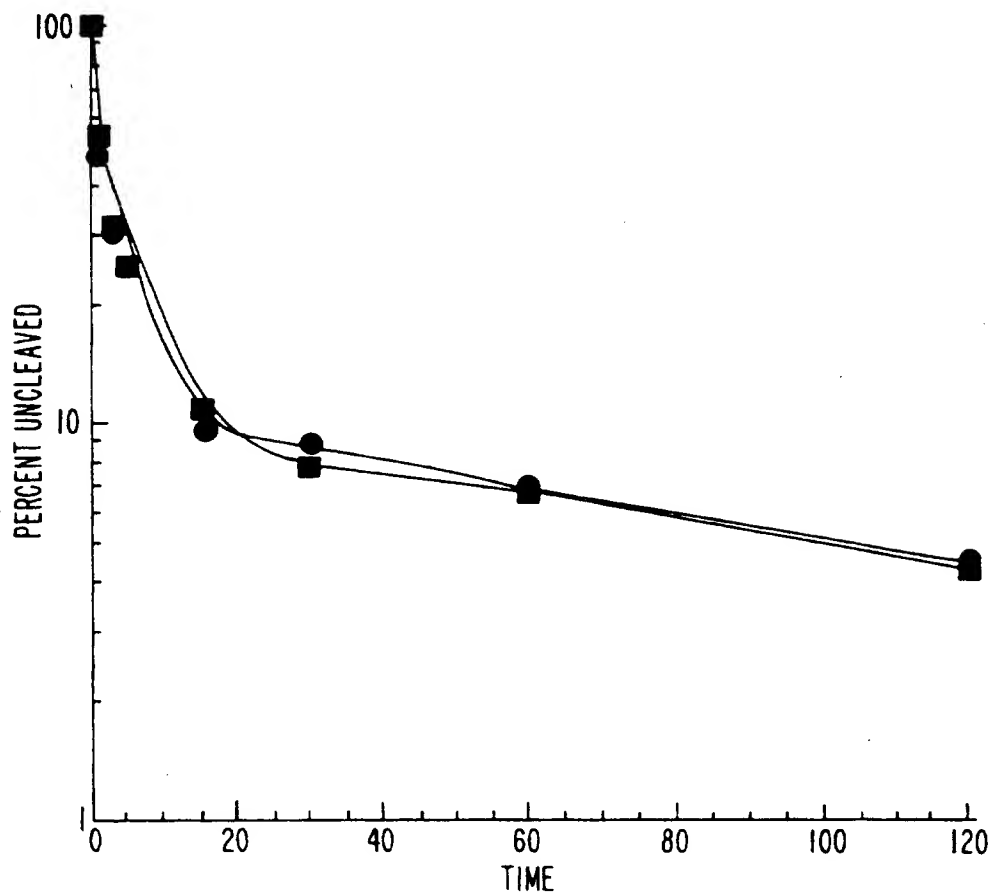
FIG. 15.



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FIG. 16.

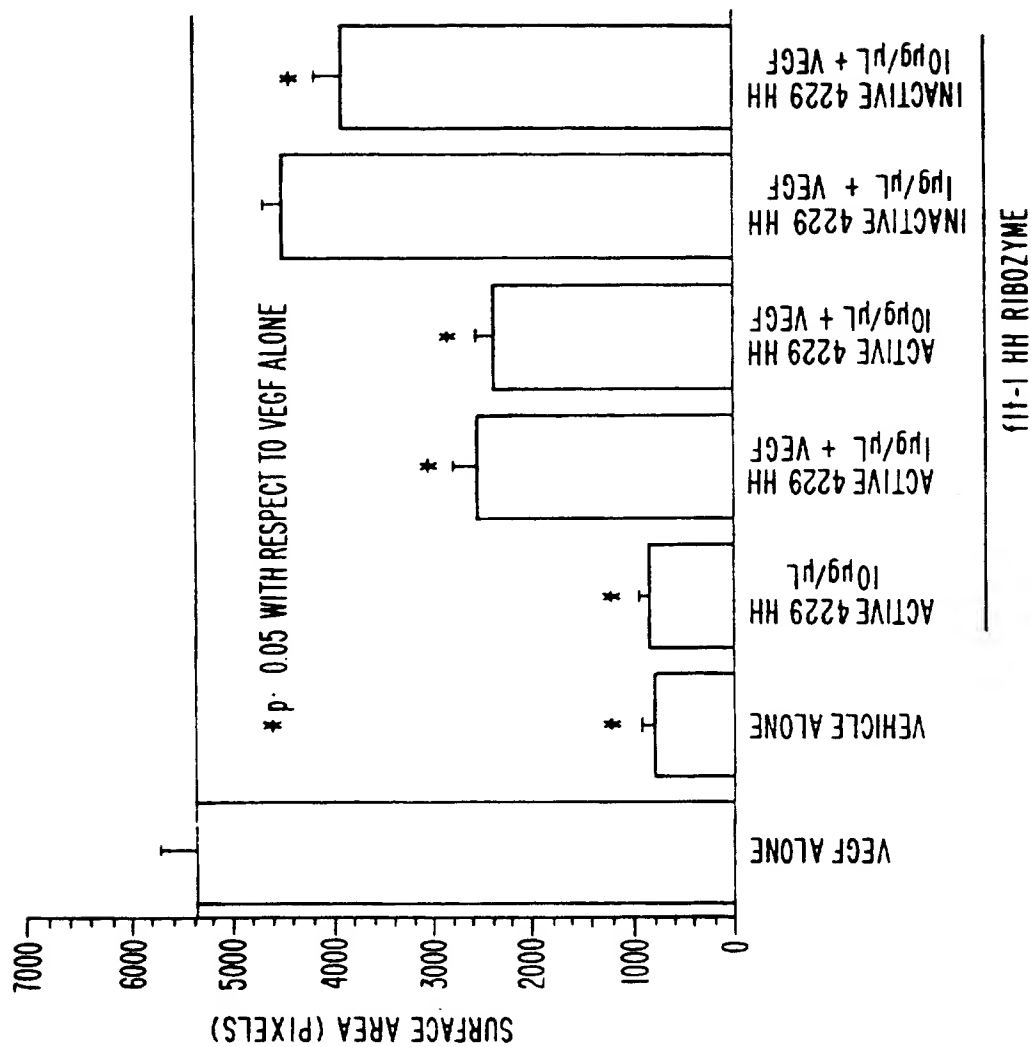


	STEM II
■	3bp
●	4bp



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FIG. 18.





## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup>:</b> C12N 15/11, 9/00, 5/10	<b>A3</b>	<b>(11) International Publication Number:</b> WO 97/15662 <b>(43) International Publication Date:</b> 1 May 1997 (01.05.97)
<b>(21) International Application Number:</b> PCT/US96/17480 <b>(22) International Filing Date:</b> 25 October 1996 (25.10.96)  <b>(30) Priority Data:</b> 60/005,974 26 October 1995 (26.10.95) US 08/584,040 11 January 1996 (11.01.96) US  <b>(71) Applicants:</b> RIBOZYME PHARMACEUTICALS, INC. [US/US]; 2950 Wildemess Place, Boulder, CO 80301 (US). CHIRON CORPORATION [US/US]; 4560 Horton Street, Emeryville, CA 94608 (US).  <b>(72) Inventors:</b> PAVCO, Pamela; 705 Barberry Circle, Lafayette, CO 80026 (US). McSWIGGEN, James; 4866 Franklin Drive, Boulder, co 80301 (US). STINCHCOMB, Dan; 7203 Old Post Road, Boulder, CO 80301 (US). ESCOBEDO, Jaime; 1470 Livorna Road, Alamo, CA 94507 (US).  <b>(74) Agents:</b> HELLENKAMP, Amy, S. et al.; Lyon & Lyon L.L.P., Suite 4700, 633 West Fifth Street, Los Angeles, CA 90071- 2066 (US).		<b>(81) Designated States:</b> AU, CA, JP, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>  <b>(88) Date of publication of the international search report:</b> 10 July 1997 (10.07.97)
<b>(54) Title:</b> METHOD AND REAGENT FOR THE TREATMENT OF DISEASES OR CONDITIONS RELATED TO LEVELS OF VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR  <b>(57) Abstract</b>  Nucleic acid molecule which modulates the synthesis, expression and/or stability of an mRNA encoding one or more receptors of vascular endothelial growth factor.		

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 96/17480

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 6 C12N15/11 C12N9/00 C12N5/10

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 6 C12N C07K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 94 11499 A (MAX-PLANCK-GESELLSCHAFT ZUR FÖRDERUNG DER WISSENSCHAFTEN E.V.) 26 May 1994 see page 30, line 18 - page 32, line 3 ---	1-23
X	WO 94 21791 A (J.E. BERGMANN AND R.E. PREDDIE) 29 September 1994 see page 10, line 10 - line 26 ---	1,2,19
E	WO 97 00957 A (PRESIDENT AND FELLOWS OF HARVARD COLLEGE) 9 January 1997 see page 34, line 12 - line 21 ---	1-23
A	WO 95 04142 A (HYBRIDON, INC.) 9 February 1995 cited in the application see the whole document --- -/-	1-23

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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\*&\* document member of the same patent family

Date of the actual completion of the international search

16 May 1997

Date of mailing of the international search report

30.05.97

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Authorized officer

Cupido, M

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 96/ 17480

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 16-18  
because they relate to subject matter not required to be searched by this Authority, namely:  
Remark: Although these claims are directed to a method of treatment of the human body, the search has been carried out and was based on the alleged effect of the claimed nucleic acid molecules.
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1. claims 1-23 (all partly): Nucleic acid molecules specific for target sequences in the flt-1 gene.
  2. claims 1-23 (all partly): Nucleic acid molecules specific for target sequences in the flk-1/KDR gene insofar they are not included in invention 1 as defined in table X.
1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International Application No

PC1/US 96/17480

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NUCLEIC ACIDS RESEARCH SYMPOSIUM SERIES, no. 31, 9 November 1994, page 163/164 XP002002020 USMAN N ET AL: "CHEMICAL MODIFICATION OF HAMMERHEAD RIBOZYMES: ACTIVITY AND NUCLEASE RESISTANCE" -----	1-23

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

page 2 of 2

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 96/17480

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